

Date: March 8, 2018

From: Brian Treasure, Occupational Safety & Health Specialist (00QS)

Subj: Mold Risk Management

Re: OSH-2018-016

To: Joshua Farber, Service Chief, Engineering (138)

Thru: Carlos Aguilar, Service Chief, Occupational Safety & Health Department (00QS)

In the absence of specific regulations and policies, here is guidance on dealing with indoor fungal (mold) growth at the SLC VA campus to establish standard work practices.

Molds can be found almost anywhere; they can grow on virtually any organic substance, as long as moisture and oxygen are present. When excessive moisture accumulates in buildings or on building materials, mold growth will often occur, particularly if the moisture problem remains undiscovered or unaddressed.

Many types of mold exist. All molds have the potential to cause health effects. Molds can produce allergens that can trigger allergic reactions or even asthma attacks in people allergic to mold. Others are known to produce potent toxins and/or irritants.

There are no specific regulatory limits for mold exposure, only guidelines. Mold spore levels should be the same or less indoors vs. outdoor levels. The same types of mold spores should be present in the indoors and outdoors.

Since mold requires water to grow, it is important to prevent moisture problems in SLC VA buildings. Moisture problems may include roof leaks, landscaping or gutters that direct water into or under buildings. Delayed maintenance or insufficient maintenance is also associated with moisture problems.

I. Water Intrusion Investigation

The three primary indicators of a possible fungal growth are visual signs; musty odor or smell; and water intrusion. Any one of these three indicators warrant further investigation for fungal growth within the vicinity. The vicinity includes adjacent areas horizontally and vertically; hidden or inaccessible areas (i.e. inside walls); and interstitial spaces. See Attachment A for a checklist for tools to aid in the investigation. There are five questions to the investigation.

1. What is the source of water?
 - a. Water from broken pipe
 - b. Water from roof leak
 - c. Water from ground
 - d. Water from accidents/weather
 - e. Water from vandalism
 - f. Water from condensation
2. What is the extent of the water intrusion?

- a. Water flows down hill
 - b. Pools in low points
 - c. Travel is affected by the absorbency of effected materials
3. Is there secondary water damage?
 - a. Wicking
 - b. Condensation/vapor
 - c. Substrate acclimation
 - d. Ice
 - e. Subterranean
4. Is there microbial growth?
 - a. Bacteria, such as Legionella
 - b. Viruses
 - c. Fungi
5. What is the extent of microbial spread?
 - a. Moisture mapping

If fungal growth is discovered during the Water Intrusion Investigation, any exposed area should be covered with poly and securely taped down with impermeable tape (i.e. duct tape) to prevent the inadvertent spread of mold spores.

II. Remediation and General Guidelines:

Respond quickly with appropriate actions to stop water damage and limit potential exposure to building occupants. There should be an immediate remediation response (24 – 48 hours) and thorough clean-up, drying and removal of water damaged materials (Attachment D). Make necessary changes to correct the underlying moisture problem. If the relative humidity (RH) is the cause of the moisture it should be reduced to < 60%.

The goal of remediation is to remove or clean contaminated materials to prevent emissions from entering occupied, non-remediation areas and to protect workers performing the abatement. It is also to clean non-porous and semi-porous structurally sound building materials. Porous materials should be discarded.

All remediations will require an Infection Control Risk Assessment (ICRA) and most will require a Construction Safety Risk Assessment (CSRA) and an Interim Life Safety Measures (ILSM) review.

The extent of the microbial spread will dictate the level of remediation response. There are five levels of remediation response. Attachment B goes into detail on the recommendations for each level. The levels are basically categorized as:

1. Level I – small isolated areas (10 ft² or less)
2. Level II – mid-sized isolated areas (10 – 30 ft²)
3. Level III – large isolated areas (30 – 100 ft²)
4. Level IV – extensive contamination (>100 contiguous ft² in an area)
5. Level V – remediation of HVAC systems (small <10 ft², large >10 ft²)

Regardless of the remediation response level, any time there are associated health complaints, an IAQ/IH should be consulted.

It should also be noted that the use of a chemical or biocide that kills organisms such as mold (chlorine bleach, for example) is not recommended as a routine practice during mold cleanup. Killing microorganisms usually does not destroy their antigenic or toxigenic properties.

Communication with staff is essential for successful mold remediation. Some employees will naturally be concerned about mold growth in their work area. Staffs' perceptions of the health risk may rise if they perceive that information is being withheld from them. The status of water intrusion investigations and remediation should be openly communicated including information on any known or suspected health risks.

Establish that the health and safety of veterans, employees and visitors are top priorities. Demonstrate that the staffs' concerns are understood and taken seriously. Identify a person whom employees can contact directly to discuss questions and comments about remediation activities.

Surgery recovery patients, people with immune suppression, asthma, hypersensitivity pneumonitis, severe allergies, or chronic inflammatory lung diseases should be removed from affected areas during remediation.

III. Quality Assurance Guidelines:

Stringent quality assurance (QA) principles should be followed to ensure that mold remediation is successful. Documentation should be written and photographed (Attachment C). Documentation should include:

1. Elimination of water; and
2. Extent of microbial spread; and
3. Appropriate containment protocols used; and
4. Appropriate PPE use; and
5. Mold removal & appropriate cleaning; and
6. Clearance sampling; and
7. Status of hidden areas; and
8. Repair or removal of water intrusion source.

Mold remediation contractors should be trained and understand specifications in mold, containment, personal protective equipment (PPE), respiratory protection plan, and hazard communication. They should be water damage certified (IICRC or Association of Specialists in Cleaning and Restoration (ASCR) water loss institute (WLI)). They should be trained and experienced in decontamination and moving property. They need to be licensed general contractors when dealing with structural components. Consideration should also be given as to whether the remediation and reconstruction are fiscally beneficial as a turnkey unit.

The use of viable air sampling to establish a pre-remediation baseline within an indoor environment should be done if there is a potential or concern of an Environmental/Toxic Exposure event(s). Non-viable air sampling would typically be sufficient for a basic remediation.

Air samples must be analyzed by a lab that is AIHA Environmental Microbiology Laboratory Accreditation Program (EMLAP) accredited.

Medical evaluations are recommended for individuals with persistent health problems that appear to be related to mold, and infants (<1 yr) should be evaluated by an appropriate physician.

The aim of this memorandum is to establish general guidance on dealing with indoor fungal (mold) growth at the SLC VA campus to establish standard work practices. Each case, however, is somewhat different, so if there is a situation not addressed by these basic guidelines, industry best practices should be used.

The recommendations presented are based on information derived from US Environmental Protection Agency (EPA); US Occupational Safety and Health Administration (OSHA); American Conference of Government Industrial Hygienists (ACGIH); American Industrial Hygiene Association (AIHA); Institute of Inspection, Cleaning and Restoration Certification (IICRC); and New York City Department of Health (NYC DOH) publications.

I am happy to answer any questions you may have. I can be reached at 801.582.1565 x4450.

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Attachments:

- A: Water Intrusion Investigation Tool Kit checklist
- B. Remediation Levels Recommendations
- C. Mold Remediation Quality Assurance checklist
- D. Guidelines for Response to Clean Water Damage

Attachment A

Water Intrusion Investigation Tool Kit

- ☐ Moisture Meter
- ☐ ATP Meter (Bio-Reveal)
- ☐ FLIR camera
- ☐ Bore scope camera
- ☐ Drill (for drilling hole for bore scope camera)
- ☐ Flashlight
- ☐ Ladder
- ☐ Architectural drawings
- ☐ Green, yellow, red stickers (for moisture mapping)
- ☐ Sharpie
- ☐ Poly and duct tape
- ☐ Air pump & cartridges (optional)

Attachment B

Remediation Levels Recommendations

Level I Recommendations (<10 ft²)

- Remediation conducted by regular building staff that have received HazCom training
- PPE used (N95 resp. gloves, eye protection)
- Vacate area but not adjacent areas
- Containment – No / Dust suppression - Yes
- Contaminated materials bagged
- Wet wiping of work area
- Work areas left clean and dry

Level II Recommendations (10-30 ft²)

- Level I plus:
 - Cover work area with plastic sheet(s) and sealed with tape to contain dust debris
 - HEPA vacuuming and wet wiping of work area

Level III Recommendations (30-100 ft²)

- Level II plus:
 - A safety and health professional should be consulted for project oversight
 - Use trained personnel
 - Contain work area and adjacent work areas
 - Contain HVAC system in work and adjacent areas
 - Vacate adjacent work areas
 - Vacate nearby compromised individuals

Level IV Recommendations (100+ft²)

- Level III plus:
 - Use full-face respirators and disposable clothing for workers
 - Negative pressure containment w/HEPA filtration, airlocks, and decontamination room
 - Wet wipe and/or HEPA vacuum outside of waste containers
 - Clearance air monitoring

Level V Recommendations

- Small (<10 ft²):
 - HazCom trained building staff
 - N-95 respirators, gloves, glasses
 - Shut down HVAC
 - Cover work area & use dust suppression
 - Remove growth-supporting materials (liners, filters, etc.)
 - Wet wipe/HEPA vacuum work area

- Biocides if appropriate
- Large ($>10\text{ ft}^2$)/Same as Small ($<10\text{ ft}^2$) plus:
 - Use a health and safety professional for oversight
 - Full face respirators for areas $>30\text{ ft}^2$
 - Isolate work areas with negative pressure, HEPA filters, airlocks, decontamination room
 - Wet wipe/HEPA vacuum waste containers ($>30\text{ ft}^2$)
 - Clearance air monitoring

Attachment C

Mold Remediation Quality Assurance Checklist

1. Pooled or standing water has been eliminated:
 - ☐ Copy of completed Electronic Work Order (EWO)
 - ☐ Photo(s)
2. Extent of microbial spread:
 - ☐ Moisture map
 - ☐ Photo(s)
3. Safety documents:
 - ☐ ICRA (Infection Control Risk Assessment)
 - ☐ Copy of all SDSs
 - ☐ CSRA (Construction Safety Risk Assessment) *if required
 - ☐ ILSM (Interim Life Safety Measure) *if required
4. Appropriate containment protocols used:
 - ☐ Copy of remediation plan/design paperwork
 - ☐ Photo(s)
5. Appropriate PPE used:
 - ☐ Photo(s)
6. Mold removed and all surfaces cleaned appropriately:
 - ☐ Photo(s)
7. Clearance sampling:
 - ☐ Copy of EMLAP lab report(s)
 - ☐ Photo(s) of pump location(s)
8. Status of hidden areas:
 - ☐ Drawings/maps of interstitial space(s)/pipe chase(s)
 - ☐ Photo(s) (inside – bore scope, outside)
9. Repair or removal of water intrusion source:
 - ☐ Copy of completed Electronic Work Order (EWO)
 - ☐ Photo(s)
10. Completed Remediation QA Package filed with:
 - ☐ COR/Facility Maintenance files
 - ☐ Occupational Safety/IH
 - ☐ Infection Control

Attachment D

Table 1: Water Damage – Cleanup and Mold Prevention

Guidelines for Response to Clean Water Damage within 24 – 48 Hours to Prevent Mold Growth*	
Water-Damaged Material†	Actions
Books and papers	<ul style="list-style-type: none"> * For non-valuable items, discard books and papers. * Photocopy valuable/important items, discard originals. * Freeze (in frost-free freezer or meat locker) or freeze-dry.
Carpet and backing – dry within 24 – 48 hours§	<ul style="list-style-type: none"> * Remove water with water extraction vacuum. * Reduce ambient humidity levels with dehumidifier. * Accelerate drying process with fans.
Ceiling tiles	<ul style="list-style-type: none"> * Discard and replace.
Cellulose insulation	<ul style="list-style-type: none"> * Discard and replace.
Concrete or cinder block surfaces	<ul style="list-style-type: none"> * Remove water with water extraction vacuum. * Accelerate drying process with dehumidifiers, fans, and/or heaters.
Fiberglass insulation	<ul style="list-style-type: none"> * Discard and replace.
Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	<ul style="list-style-type: none"> * Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. * Check to make sure underflooring is dry; dry underflooring if necessary.
Non-porous, hard surfaces (Plastics, metals)	<ul style="list-style-type: none"> * Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.
Upholstered furniture	<ul style="list-style-type: none"> * Remove water with water extraction vacuum. * Accelerate drying process with dehumidifiers, fans, and/or heaters. * May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture.
Wallboard (Drywall and gypsum board)	<ul style="list-style-type: none"> * May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. * Ventilate the wall cavity, if possible.
Window drapes	<ul style="list-style-type: none"> * Follow laundering or cleaning instructions recommended by the manufacturer.
Wood surfaces	<ul style="list-style-type: none"> * Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) * Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. * Wet paneling should be pried away from wall for drying.
<p>*If mold growth has occurred or materials have been wet for more than 48 hours, consult Table 2 guidelines. Even if materials are dried within 48 hours, mold growth may have occurred. Items may be tested by professionals if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.</p> <p>These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then Personal Protective Equipment and containment are required by the Occupational Safety and Health Administration (OSHA). An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.</p> <p>† If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.</p> <p>§ The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.</p>	