NORTH CAROLINA GUIDELINES FOR MOISTURE MANAGEMENT AND MOLD REMEDIATION IN HEALTHCARE FACILITIES

These guidelines are a consensus document approved by the Association for Professionals in Infection Control (APIC-NC), the Statewide Program for Infection Control and Epidemiology (SPICE), the Public Health Institutional Task Force for Best Practices (PHIT Force), North Carolina State Division of Public Health, and the North Carolina Infectious Disease Society (NCIDS).

INTRODUCTION

Molds (fungi) produce spores and are part of the environment occurring naturally in soils and on plants. These same spores can be found on plaster, building materials, ceiling tiles and dust. The generation and/or suspension of spore-contaminated dust during construction, demolition, and maintenance activities are usually not a problem for healthy persons. However, in the healthcare environment these spores can cause or exacerbate serious illness or even cause death in some individuals. This is why good infection control practices must be followed when working in these settings.

Even when construction, demolition, and maintenance are not occurring, water damage from a catastrophic event, storm flooding, sewage backflow, plumbing breaks, or insidious water intrusion and moisture buildup from poorly regulated HVAC or humidity controls can create a mold problem. Indoor environments are ecosystems of microenvironments where organisms compete for moisture and nutrients (i.e., substrates) in relation to environmental factors. Mold substrates commonly found in the indoor environment are wood, wallboard, wallpaper, ceiling tile, insulation, concrete, fireproofing, glues/sealants. Examples of microenvironments include carpet, upholstery, restrooms, food storage areas, crawl spaces, ceiling spaces, trashcans, and HVAC systems (e.g., ductwork, drain pans, and air intakes). Microenvironments collect and retain dust and associated pollutants (e.g., mold spores) on a continual basis. For example, dry maintained carpet typically contains at least 100,000 mold spores/gram of carpet dust. A reservoir of uncontrolled moisture (i.e., water damage) in a microenvironment will initiate the mold cycle of germination and growth. This results in a shift of fungal ecology leading to amplification and dissemination of mold spores and growth fragments. Typical results from shifts in ecology are damaged materials, degraded air quality, human exposures and potential health risks.

PURPOSE

The intent of this guideline is to assist North Carolina healthcare facilities in the development of a facility policy for the prevention, control, and when necessary removal of mold contamination and the correction of moisture/water intrusion. The policy is designed for infection control professionals, facility engineers, architects, contractors, administrators, and risk managers

regarding infection control issues and interventions associated with moisture and mold management including the facility design and construction/renovation remediation projects. This guideline outlines actions and responsibilities for individuals involved in evaluation or remediation of moisture and mold. (See Sample Policy, page 7.)

BACKGROUND

Most people do not experience problems associated with mold exposure; however, some molds may adversely affect the health of people in three ways:

- ***Allergy*:** some people may develop allergic rhinitis ("hay fever") with symptoms such as sneezing, irritation, congestion or runny nose. Asthma episodes may also be triggered by mold exposure.
- ***Infection:*** some types of mold may cause local skin infections such as athlete's foot in healthy individuals. However, persons who are immunocompromised or have non-intact skin may become infected and seriously ill from molds not harmful to healthy persons. In addition, inhalation of spores may lead to pulmonary infections and/or disseminated disease.
- ***Toxicity*:** some molds produce toxic substances (mycotoxins) in some circumstances, some of which have valuable use (e.g., penicillin). Some mycotoxins have caused illness in animals and people eating moldy foods. But illness from breathing mycotoxins has occurred only with exposure to large amounts of airborne molds (e.g., farmers breathing in confined spaces containing moldy hay).

Reports of breathing "toxic mold" in home or buildings causing a variety of significant systemic effects (e.g., confusion, lethargy) have had no supporting scientific evidence.

STATEMENT OF RESPONSIBILITY

Mold abatement/control is an issue that involves the cooperation of many departments with each department having specific responsibilities other than technical issues surrounding mere mold abatement/cleaning. These responsibilities begin with the design of a building and end when the building is razed. Each department must have an understanding of and commitment to the process and plan.

Design and Construction

Design and oversight of construction is necessary to assure proper design and construction details to prevent water infiltration around windows or through walls and to assure humidity control particularly during the cooling season. As part of the commissioning of the building, testing of HVAC system and any other ventilation systems (e.g., lab hoods) must be performed to assure they are operating as designed. Depending upon what geographic section of the state construction occurs, humidity may also need to be a parameter to regulate and additional insulation on pipes in hot/humid climates may be needed.

Maintenance and Retro Fit

Maintenance must repair moisture intrusions when they occur and replace or repair damaged materials as necessary. A high level of containment and control to prevent the spread of mold contamination may be required during maintenance activities due to patient care concerns. HVAC modifications will likely be necessary when a space is remodeled where walls are moved or added and where laboratory hoods are added or removed.

Infection Control

Assure patient health and employee health is not impacted as a result of moisture intrusion or mold growth and remediation by reviewing the Infection Control Risk Assessment (IRA) and assist with training.

Industrial Hygiene/Safety/Employee Health

If industrial hygienists are available, they should be tasked in assisting with mold investigation, training, protecting patients in adjacent areas and other tasks associated with their expertise.

Administration

The administrative units should understand the need for quick resolution of financial, personnel and training issues.

Prevention Activities

Establish a multidisciplinary team that includes infection control staff to coordinate demolition, construction and renovation projects and consider proactive preventive measures at the inception. Moisture control is the key to mold control. When water leaks or spills occur indoors - act promptly. Any initial water infiltration should be stopped and cleaned promptly. A prompt response (within 24-48 hours) and thorough clean-up, drying and/or removal of water-damaged materials will prevent or limit mold growth.

Mold prevention recommendations include:

- Having Infection Control and facility safety and health review Infection Control Risk Assessment (ICRA) and review designs for preventable structural issues that could lead to water intrusion.
- Developing a system to monitor history of existing moisture problems in the facility.
- Repairing plumbing leaks and structural leaks in the building as soon as possible.
- Prohibiting vinyl wallpaper on exterior walls.
- Considering using mold-resistant wallboard/sheetrock (drywall).
- Using grout to seal tile.
- Considering using sealed or seamless flooring in patient care areas, particularly in patient care bathrooms.
- Keeping HVAC drip pans clean, flowing properly, and unobstructed.
- Performing regularly scheduled building/HVAC inspections and maintenance, including filter changes.
- Maintaining indoor relative humidity below 60% (25-60% if possible).

- Venting moisture-generating appliances, such as dryers, to the outside.
- Venting kitchens (cooking areas) and bathrooms according to local code requirements.
- Inspecting and maintaining roofs and windows.
- Replacing of stained ceiling tiles and investigation of the cause of stains and correction of the moisture intrusion.
- Installing water sensors in high potential risk areas.
- Cleaning and drying wet or damp spots on surfaces when observed.
- Providing adequate drainage around buildings and sloping the ground away from building foundations.
- Ventilating crawl space.
- Placing air in-take vents in appropriate locations.
- Following carpet cleaning guidelines with respect to quick (<24 hours) drying.
- Following all local building codes.
- Pinpointing areas where leaks have occurred, identifying the causes, and taking preventive action to ensure that they do not reoccur.

Questions that may assist in determining whether a mold problem currently exists:

- Are building materials or furnishings visibly moisture damaged?
- Have building materials been wet more than 48 hours?
- Are there existing moisture problems in the building?
- Are building occupants reporting musty or moldy odors?
- Are building occupants reporting health problems that they think are related to mold in the indoor environment?
- Has the building been recently remodeled or has the building use changed?
- Has routine maintenance been delayed or the maintenance schedule been altered?

Remediation Plan

Remediation includes both the identification and correction of the conditions that permit mold growth, as well as the steps to safely and effectively remove mold damaged materials.

Before planning the remediation:

1) Assess the extent of the mold or moisture problem, the type of damaged materials, and pathways for exposure. If you choose to hire outside assistance to do the cleanup, make sure the contractor has experience with mold remediation.
2) Check references and ask the contractor to follow the recommendation in the Environmental Protection Agency's publication, "Mold Remediation in Schools and Commercial Buildings," or other guidelines developed by professional or governmental organizations.
3) If in-house expertise is not available, it is suggested to choose a firm not associated with the remediation contractor to perform an evaluation as to the cause and extent of remediation required as well as to propose protection criteria for staff, patients, and the building. One profession that may be helpful in this is industrial hygienists. Contact information can be obtained at:

http://www.aiha.org/Content/AccessInfo/consult/consultantsearch.htm
This site lists industrial hygiene consultants that can be of assistance in investigation and defining the scope of projects. You may also find consultants in the yellow pages under industrial hygiene, laboratories, moisture control, or mold remediation. Those for sampling are more likely to be under industrial hygiene, laboratories, or microbiologists. When hiring any contractor/consultant it is recommended that you get and check references.

4) Some companies specialize in water damage restoration and can assess the issues involved in cleaning up buildings. Two professional trade groups that may be able to help locate such an expertise are the Association of Specialists in Cleaning and Restoration (http://www.ascr.org) and the Institute of Inspection, Cleaning, and Restoration Certification (http://www.iicrc.org).

The remediation plan should include:

1) Steps to permanently correct the water or moisture problem
2) The use of appropriate personal protective equipment (PPE)
3) Steps to carefully contain and remove moldy building materials in a manner that will prevent further contamination.
4) Depending on the size and complexity of the job, allow for revision of the plan if circumstances change or new facts are discovered. The types of affected materials and pathways for exposure are important considerations in any remediation plan. Porous materials may need removal and semi-porous and non-porous materials may only need cleaning and drying.
5) Evaluating patient or healthcare case workers' exposure to contaminated air and construction materials. Patients may need to be relocated if traffic flow of construction activity cannot be found through non-patient areas.

Remediation

In order to protect the health of cleanup personnel, other workers, and patients during mold remediation, EPA and OSHA have guidelines (see Attachment II, pages 13-14) that are based on the size of the area impacted by mold contamination. These remediation guidelines are based on the size of the affected area to make it easier for remediators to select appropriate techniques, not on the basis of research showing there is a specific method appropriate at a certain number of square feet. The guidelines have been designed to help construct a remediation plan. Professional judgment and experienced remediators may adapt the guidelines to specific situations. However, when in doubt, caution is advised. Professional remediators may be consulted for additional information.

Personal Protection

Although the level of personal protection and environmental controls and procedures recommended in these guidelines is based on total surface area contaminated and the potential for remediator or occupant exposure, professional judgment should always play a part in remediation decisions.

Environmental Testing

The decision on environmental testing needs to be made on a case-by-case situation after all the variables have been considered. This should be coordinated with Infection Control. Information on testing is included at the OSHA web site http://www.osha.gov/dts/shib/shib101003.htmlhttp://www.osha.gov/dts/shib/shib101003.html or the Minnesota Department of Health http://www.health.state.mn.us/divs/eh/indoorair/mold/moldtest.html.
Since there are no general accepted levels, culturing of environmental materials should generally not be done.

If mold sensitive persons react when entering a space with previously water-damaged carpet, with no odor or visible mold growth, consider the need for the carpet to be tested or discarded under controlled conditions. Controlled methods can range from personal protection to full abatement under negative air pressure conditions dependent on the extent of the damage.

Surveillance

Occupational healthcare providers should be alert for unusual mold-related illnesses (e.g., hypersensitivity pneumonitis, blastomycosis) that might occur in healthcare facility employees working as mold remediators or in mold contaminated areas in the healthcare facility. When Blastomyces infections occur in healthy host, it is usually associated with point-source occupational exposure (e.g., in a healthcare setting exposure to soil contaminated surfaces post flooding).

Scientific evidence is insufficient to support the routine clinical use of immunodiagnostic tests as a primary means of assessing environmental fungal exposure or health effects related to fungal exposure. Healthcare providers who care for persons who are concerned about the relationship between the symptoms and exposure to fungi are advised to use immunodiagnostic test results with care and only in combination with other clinical information including history, physical examination, and other laboratory data. If appropriate, allergy-prick skin testing reagents or *in vitro* tests for serum specific IgE are available that can be used to show specific IgE-sensitization to causative allergens. However, persons should be trained in the preparation of test material placement, and reading of such tests. Further, resuscitation equipment should be immediately available as anaphylaxis may occur. The conventional hierarchy of treatment for allergic diseases includes avoidance of exposure to inciting agents, pharmacotherapy, and as a last resort immunotherapy (unknown efficacy). Patient populations that are at high risk for poor health outcomes related to mold exposure because of underlying malignancies and immunosuppression should be carefully monitored for evidence of mold related diseases, especially during episodes of mold remediation.

NORTH CAROLINA SAMPLE POLICY FOR

MOISTURE MANAGEMENT AND MOLD REMEDIATOIN IN HEALTHCARE FACILITIES

I. POLICY

It is the policy of (facility name) to comply with applicable standards and recommendations related to moisture management and mold remediation in healthcare facilities.

II. PURPOSE

The purpose of this policy is to outline guidelines for the prevention, control of water intrusion and when necessary removal of mold contamination. (See Attachment I, page 12.)

III. PROCEDURE

A. General Issues
1. Stop or correct the problem causing the water intrusion.
2. Relocate patients and clean or sterilized supplies from affected areas immediately.
3. Close off shared air space from affected areas during cleanup procedures. Seal off and block return air vents if rigid barriers are used for containment. Negative pressure in relation to patient care areas should be always maintained in work zones.
4. Inventory all water-damaged areas, building materials and furnishings, patient belongings, damaged clean and sterile supplies, and equipment. Special attention should be given to identify carpet under cabinets, furnishings, etc.
5. Utilize a moisture meter to identify the extent of water damage and to determine sufficient dryness ($\leq$20%) of absorbent structural items.
6. Document the type of water damage, i.e. clean water (potable sources), steam, unsanitary water (rain, ground water), or contaminated water (sewage).
7. Both the construction team and healthcare staff in immunocompromised patient care areas should be educated regarding the airborne infection risks associated with construction projects, dispersal of fungal spores during such activities, and methods to control the dissemination of fungal spores.
8. Active surveillance should be used to monitor for airborne infections (e.g., aspergillosis) in immunocompromised patients as appropriate during construction, renovation, repairs, and demolition activities.

Note: If a steam leak is a cause of moisture damage, additional consideration for the chemicals added to the steam is needed. Even though steam is relatively clean, steam treatment chemicals may remain in the materials affected by the steam leak after the moisture has dried.

B. Sheetrock/Drywall/Lathe/Plaster
1. Remove and replace all water-damaged drywall and insulation if wet greater than 48 hours. Fans may be used to attempt drying the wall material within 24-48 hours before removing.

2. Sheetrock wet or damp by contaminated water should be disposed of immediately. Sheetrock that has been previously water damaged should be monitored for mold and disposed of if wet greater than 24 hours on a subsequent water intrusion.
3. Use a moisture meter and cut sheetrock at 12 inches to 48 inches above the water mark. Note: Molds reproduce by creating hyphae that are like tentacles that grow rapidly into porous materials. The hyphae may begin growing 24 hours after the moisture levels reach growth potential from water damage or high humidity. The longer the time in days from water damage to removal, the greater the amount of sheet rock that should be removed (i.e., 12-48 inches above the water mark).
4. When work is completed, turn the heat UP (if possible) and utilize dehumidifiers to dry the area.
5. Wet lathe and plaster will leach the minerals from the wall and form a chalky surface. The loose material on the surface will need to be removed under controlled conditions and surface allowed to dry. Controlled methods can range from personal protection to full abatement under negative air pressure conditions dependent on the extent of the damage. The dry surface can then be painted with an antimicrobial paint. (See Risk Assessment Guideline, Attachment II pages 13-14.)
6. If the plaster/lathe wall develops a strong odor, with or without visible mold growth remove people from this area of the building. Eliminate the source of the water and replace the water-damaged plaster.
7. During replacement of the sheetrock, drywell, plaster/lathe, the following general procedures are recommended.
    a) Setup critical (air sealed) barriers to prevent airflow into clean storage, patient care, or general ventilation system.
    b) Create a negative air differential in respect to patient care and areas where patients or healthcare workers may traverse or patient-related supplies are stored.
    c) Use appropriate respiratory protection, gloves and coveralls for the workers.
    d) Handwashing and showering after work in the area is also recommended.
    e) Use work practices that minimize the amount of dust generated and mold particles becoming airborne.

C. Ceiling Tiles
1. Remove and dispose of all wet ceiling tiles within 24-48 hours of water damage. The only exception would be if ceiling tile has become wet due to a small steam leak and shape of the tile has not been altered. In this situation the ceiling tile can be air dried and reused.
2. When the ceiling tile has been impacted by unsanitary water (>24 hours wet or previous water damage) or contaminated water, controlled methods should be utilized for prompt removal and disposal. (See Attachment II, pages 13-14.)

D. Electrical
1. Consider all wet wiring, light fixtures, and electrical outlets to be shock hazards until they have been checked by a building inspector and/or electrician. Until then, turn the power off in the area of water damage. **(Note: Only approved persons knowledgeable about electrical shock hazards should shut the power off.)**

2. Replace all electrical circuit breakers, Ground Fault Interrupters (GFIs), and fuses that have become wet.
3. Switches and outlets that are wet can be cleaned and reused but, when in doubt, replace them.
4. All electrical motors, light fixtures, etc. that were wet need to be opened, cleaned and air dried by a qualified person. Before being put back into service, inspect the motors, light fixtures, etc. to ensure there **are** no visible moisture/water droplets.

E. Furniture
1. Dispose of upholstered furniture that has become wet due to unsanitary or contaminated water.
2. Upholstered furniture damaged by steam leaks or direct contact with clean water should be dried within 24 hours and monitored for fungal growth and odors or discarded.
3. Hardwood furniture or laminate furniture whose laminate is intact should be air dried and cleaned with a detergent solution and rinsed with clear water and dried.
4. Laminate furniture experiencing delaminating should be disposed of because the pressed wood under the laminate absorbs water readily and is hard to dry.
5. Furniture made of particle board or pressed wafer board that has been saturated with water should be discarded. The exception would be if the furniture has become wet due to a steam leak or direct contact with potable water. In this situation the furniture can be dried and monitored closely for fungal growth/odor. If fungal growth occurs or the furniture develops an odor, the particle board/pressed wood furniture should be discarded.

F. Files/Papers
1. Remove and dispose of nonessential wet files and paperwork. The exception again would be if the moisture was due to steam leaks; then these can be dried.
2. Essential paper wet from clear or steam-damaged areas should be moved to a location where it can be dried within 24-48 hours. If unable to dry within 24-48 hours, place in a plastic bag, seal, photocopy and discard.
3. Essential paper that is wet with unsanitary or contaminated water should be placed in plastic bags, sealed and frozen until copied and discarded or a conservator is contacted.

Professional conservators should be contacted for information on handling these types of wet products: American Institute of Conservation, 202-452-9545, Fax 202-452-9328.

G. Carpet
1. Any carpet that has been made wet or damp over a large area with contaminated or outside flood waters should be discarded under controlled negative air conditions in relation to healthcare workers and patients or patient care supply areas and the entire area should be disinfected with bleach and water (or hospital-grade detergent).
2. Carpet that has become wet from unsanitary water, steam leaks, and potable water leaks can be treated per the following steps.
   a) Carpet wet less than 24 hours
      (1.) Remove all materials (e.g., furniture, file cabinets) from the carpet.

(2.) Extract as much water as possible from the carpet using wet vacuums.
(3.) Shampoo the carpet with a dilute surfactant.
(4.) Alternatively, follow label instructions. Soak with ¼ cup bleach to 1 gallon water solution. Maximum concentration: a solution of 1 part bleach to 9 parts water.

Important Note: People may have a reaction to biocides. Often, quaternary amine compounds will be used as a biocide/cleaning compound. The compound may reduce levels of bacteria, but is often ineffective in killing fungal spores. Commercial steam cleaning of carpet can be used in place of bleach. The vacuum system is housed in the truck and the water used to clean the carpet is heated near the boiling point.

(5.) Rinse and extract the carpet with clean water to remove detergent/bleach residues.
(6.) Dry the carpet within 24 hours of treatment. After work is completed, increase the room temperature and use commercial dehumidifiers, floor fans, or exhaust fans to aid in drying the carpet.

b) Carpet wet more than 48 hours
(1.) If carpet becomes wet during the WINTER with clean water, the previous protocol can be used to manage the carpet and salvage it.
(2.) Drying the carpet is usually more difficult in the summertime and water damaged carpets in humid environments often do not dry adequately. Disposal of water-damaged carpets in humid environments is often the best option.
(3.) Discard if odor develops or persists.

H. Nonporous Hard Surfaces
1. Mold removal for nonporous hard surfaces (e.g., steel)
   a) Mix 1 cup bleach in 1 gallon of water.
   b) Wash the item with the bleach mixture.
   c) Scrub rough surfaces with a stiff brush.
   d) Rinse the item with clean water.
   e) Dry the item or leave it to dry.
2. Cleaning hard nonporous surfaces to prevent mold growth
   a) Wash the surface with soap and clean water.
   b) Then disinfect with a mixture of 1 cup bleach in 5 gallons of water.
   c) Allow to air dry.

I. Personal Protection
1. If possible, remediation activities should be scheduled during off-hours when building occupants are least likely to be affected.
2. Use personnel trained in mold remediation procedures, equipped with appropriate respiratory and personal protection for mold remediation. (See Attachment II, pages 13-14.)
3. Negative air pressure enclosures may also be set up for limiting cross-contamination from damaged areas. Monitor so that negative pressure will not pull air in from more contaminated areas.

J. Environmental Testing
    1. Post cleanup clearance visual inspection should be conducted to ensure appropriate cleaning has been performed. This does not necessarily mean air samples. A visual inspection in conjunction with possibly some surface samples is more appropriate.
    2. Reports of odors of mold should be investigated thoroughly by visual inspection (e.g., under sinks, enclosed areas) and by checking for previous reports or work requests of water damage.

ATTACHMENT I

DEFINITIONS

CLEAN WATER - ***Potable water***

CONTAMINATED WATER***: water that may have or is known to have unprocessed sewage.***

MOLD AMPLIFICATION***: is rapid fungal growth under optimum conditions (i.e., amount of free water available to mold spores for growth on a substrate) that results from the increased water activity (>24 hrs) and follows water migration.***

MOLD REMEDIATION/ABATEMENT***: includes both finding and fixing conditions allowing mold growth. Also includes steps to safely remove mold and water damaged materials***

MOLDS***: (fungi) are part of the natural environment. All molds are fungi but not all fungi are molds. There are over 1000 species but most commonly found molds in the US associated with negative health effects from indoor environmental exposure are Aspergillus, Penicillium, Fusarium, Rhizopus, and Alternaria***

UNSANITARY WATER - ***water whose source is from rain that has not been treated or tested for humans, or flood waters not contaminated by sewage or ground water infiltration.***

WATER INTRUSION: ***shall be defined as any water-based liquid that is released in such a manner that it has absorbed into any building components. The components may include carpet, wood, drywall wall, ceiling tiles, or any porous materials that absorb and hold moisture. The water-based liquids shall include but is not limited to potable water, domestic hot water, reheat water, steam, steam condensation, sewage and rainwater. Liquid substances that may be classified as biological hazard shall be treated as a hazardous waste spill.***

ATTACHMENT II

MOLD REMEDIATION RISK ASSESSMENT GUIDELINES

Step 1. Determine risk group by location:

Risk Group			
Low	**Medium**	**High**	**Sensitive**
Offices Administration Non-patient areas Parking Decks Library Maintenance Shops	On call sleep rooms and other sleeping areas Dining and vending areas Non-hazardous lab Clinical Storage Animal areas Computer rooms Morgue Corridors between patient areas Depts. Not Identified Above	Patient care areas Clinics Dialysis Diagnostic areas (e.g., gastrointestinal and bronchoscopy suites) Emergency Department (ED) Treatment areas Radiology (other than invasive areas) Kitchen (Food preparation area)	Operating Room and One-Day Surgery Labor and Delivery Intensive Care Unit Trauma Emergency Department Pharmacy Immuno-comprised patient care areas and clinics Clinical labs Cardiac Cath Lab Nursery Neonatal Intensive Care Unit Invasive treatment & procedure area Radiology (invasive area) Sterile Storage Central Supply

Step 2. Determine level of remediation measures based on area contaminated and risk group.

Mold Remediation Matrix: Risk Group - Area of Contamination				
Parameter of Area Contaminated	**Risk Group**			
	Low	**Medium**	**High**	**Sensitive**
Small Isolated Areas < 30 ft^2 ceiling tiles, small areas on walls, or single wallboards	**I**	**I**	**I**	**II**
Large Isolated Areas 30-100 ft^2 (several wallboard panels)	**II**	**II**	**III**	**III**
Extensive Involvement > 100 ft^2 contiguous in an area	**III**	**III**	**IV**	**IV**

Adapted from U.S. Environmental Protection Agency, Mold Remediation in Schools and Commercial Buildings and V Kennedy, Barnard, St Luke's Episcopal Hospital, Houston, TX.

Step 3. Circle the measures applicable for the work.

LEVEL I (ITEMS 1-10)

1. Work area shall be unoccupied during abatement. Appropriate signage is posted.
2. Vacating spaces adjacent to work area shall be evaluated.
3. Personal Protective Equipment (PPE) (N95 respirator is recommended according to OSHA Respiratory Protection Standard, utility gloves, eye protection) should be worn by remediation staff.
4. Containment of work area is not necessary. (Level I only)
5. Dust suppression methods (High Efficiency particulate air filters [HEPA] vacuum, misting and damp mop of surfaces) shall be used.
6. Contaminated materials shall be removed in a sealed plastic bag.
7. HEPA vacuum/mop work area at end of work period.
8. Keep doors to work area closed.
9. Remove trash daily in clean covered containers.
10. HEPA vacuum/mop outside work areas as needed (daily). Provide walk-off mats and change as needed.

Level II (all of Items 1-13)

11. Work areas shall be contained. Erect temporary barriers, seal penetrations to prevent dust migration. Plastic sheeting must be fire rated. Openings shall be fixed, closed doors or airlocks. Suggest framed barrier, temporary wall or ceiling clips for jobs > 24 hours. If area cannot be enclosed, consult Safety and Infection Control (IC).
12. Turn off and/or seal HVAC vents. Use HEPA filtration units exhausted outside. Consult Safety & IC if outside exhaust not possible. Exhaust must not be on ground level near pedestrians or near air intakes.
13. All areas inside enclosure shall be HEPA vacuumed and cleaned with damp cloth and/or mop with detergent solution and visibly clean before removing barriers.

Level III (all of Items 1-17)

14. Recommend personnel specially trained in mold remediation (i.e., industrial hygienists) be consulted.
15. Abatement consultant should specify PPE.
16. Work area enclosure shall be maintained under negative pressure using HEPA filtered units exhausted outside. Consult Safety & IC if outside exhaust not possible.
17. Respirators must be used in accordance with the Respiratory Protection STANDARD (29 CFR 1910.135).

Level IV (all of Items 1-21)

18. Enclosure shall include anti-chamber/decon room for trash bag/container cleanup (HEPA vacuumed or damp cloth and detergent solution) before removal.
19. Highly sensitive abatement project that may require unoccupied adjacent spaces. Determinations will be made by Hospital Epidemiologist or designee.
20. Need for special clearance procedures prior to re-occupancy will be determined by Hospital Epidemiologist or designee
21. Personnel trained in the handling of hazardous materials and equipped with: full face respirators with HEPA cartridges, disposable protective clothing covering entire body including both head and shoes, and gloves.

Adapted from the New York City Department of Health and Mental Hygiene; OSHA, A Brief Guide to Mold in the Workplace, and Kennedy V, Barnard B, St Luke's Episcopal Hospital, Houston, TX in Bartley J, APIC Infection Control Tool Kit Series: Construction and Renovation, APIC,1999.

Risk Assessment Date: _____

Signatures: _____ _____

Maintenance/Construction Project Manager — Date signed

_____ _____

Infection Control or Corporate Safety — Date signed

Location: _____

Team Members: _____

_____

_____

REFERENCES

American College of Occupational and Environmental Medicine. Evidence Based Statements: Adverse Human Health Effects Associated with Molds in the indoor Environment. 2002.

Bennett JE. Introduction to mycoses. In: Mandell, Bennett, and Dolin, eds. Principles and Practice of Infectious Diseases, 6th ed. Philadelphia: PA: Churchill Livingstone. 2005.

Carlson N, Quraishi A. Managing Water Infiltration Into Buildings. Institute for Environmental Assessment (IE), Inc. University of Minnesota. August 30, 2003.

Institute of Medicine, Committee on Damp Indoor Spaces and Health. Damp Indoor Spaces and Health. Damps indoor spaces and health. Washington, DC: The National Academies Press; 2004.

Kennedy V, Barnard B, St Luke's Episcopal Hospital, Houston, TX in Bartley J, APIC Infection Control Tool Kit Series: Construction and Renovation, APIC,1999.

MMRW Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. June 9, 2006 Vol. 55/No. RR-8.

MMWR Recommendations and Reports Guidelines for Environmental Infection Control in Health-Care Facilities. June 6, 2003 Vol. 52/No. RR-10.

New York City Department of Health and Mental Hygiene. Guidelines on assessment and remediation of fungi in indoor environments. New York, NY: Department of Health and Mental Hygiene, 2005.
http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml#enviro (accessed March 2, 2007)

Occupational Safety and Health Administration. A Brief Guide to Mold in the Workplace Office of Science and Technology Assessment. OSHA Safety and Health Information bulletins SHIB 03-10-10

U.S. Environmental Protection Agency. Mold Remediation in Schools and Commercial Buildings. Office of Air and Radiation, Indoor Environments Division (6609-J) EPA 402-K-01-001, March 2001.
http://www.epa.gov/mold/images/moldremediation.pdf (accessed March 2, 2007)

COMMITTEE MEMBERS:

Cindy Adkins
Kathy Cochran
Evelyn Cook
Sandy Cox
Elaine Crittenton
Karen Hoffmann
Sylvia Pegg
Maureen Titus