



Guidance Document

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CT Guidelines for Mold Abatement Contractors

Introduction

This guidance document provides important information regarding mold abatement for contractors. It is available on the CT Department of Public Health (DPH) mold [website](https://ct.gov/dph/mold), and may be useful to other professionals and the general public who are interested in indoor environmental quality (IEQ) and mold abatement. DPH's mold website also includes additional information that covers a wide variety of mold topics and links to the U.S. Environmental Protection Agency's (EPA) mold resources.

Basic Tenets Concerning Mold in Indoor Environments

The basic tenets listed below should be followed whenever there is a concern about mold:

- Find the source of the moisture
- Stop the water/fix the leak
- Remove moldy materials
- Discard porous materials that have remained wet for over 48 hours
- Perform mold abatement as appropriate, according to an abatement plan designed for the particular site.

Professional Involvement

1. Abatement Contractors

There are a number of types of professional contractors that perform various kinds of environmental abatement. These include environmental contractors such as those who perform lead, radon, and/or asbestos abatement, and restoration and cleaning contractors involved in water restoration, smoke and fire restoration, and carpet cleaning specialists. Before entering into the mold abatement business, any contractor should acquire professional training in this area, and become familiar with technical and reference materials referenced in this document.

2. Training

Contractors should be trained to use state-of-the-art techniques when performing mold abatement to keep building occupants and their own workers safe. The State of Connecticut does not offer training or licensure for mold abatement contractors, but there are a number of professional organizations and trade groups that have created credentialing and standards setting programs, in the absence of federal and state regulations. Below is a list of some of the national organizations offering training and credentialing in mold abatement.

Organization	Acronym	Web Address
Institute for Inspection, Cleaning and Restoration Certification	IICRC	https://www.iicrc.org
American Council for Accredited Certification (formerly the American Indoor Air Quality Council)	ACAC	https://www.acac.org
Indoor Air Quality Association	IAQA	https://www.iaqa.org
Interactive Occupational Training	IOT	https://www.iaqa.org
Restoration Industry Association (formerly the Association of Specialists in Cleaning and Restoration - ASCR)	RIA	https://www.restorationindustry.org

The Institute for Inspection, Cleaning and Restoration Certification (IICRC) has published a voluntary standard for professional mold remediators called *IICRC Standard and Reference Guide for Professional Mold Remediation, S520* (S520). DPH recommends S520 as a minimum competency and that all mold abatement contractors doing business in Connecticut follow the principles and practices stated in the most current version. Further, DPH recommends that every mold abatement job have a full-time supervisor at the jobsite who is formally trained to understand the principles and practices described in S520. All workers, including the job-site supervisor, should be adequately trained so that they understand the proper use of personal protective equipment (PPE), know how and when to use such equipment, and can work in a safe manner without causing harm to themselves, fellow workers, building occupants, or the building.

3. Third-Party Oversight - The Industrial Hygienist/Indoor Environmental Professional

Third-party oversight should be used whenever the mold abatement contractor has questions about how to abate a certain area, whether certain methods should be employed, or if unusual circumstances exist such as health considerations of building occupants or questions about how much of an area should be abated (i.e., half of the wall vs. the entire wall). Some specific examples of when third-party oversight is recommended are:

- During a mold abatement project in a hospital, nursing home, rehabilitation facility, or medical clinic.
- In any setting where there are immunocompromised persons.
- Where there has been raw sewage contamination, and a determination must be made about what can be salvaged.
- Where an independent assessment is needed.
- Where it is determined that it would be beneficial to collect samples based upon a hypothesis generated from a site assessment. More information about analysis of environmental samples is provided on page 5.

DPH recommends that all individuals consulting on mold abatement projects, whether they are industrial hygienists (IHS) and/or independent environmental professionals (IEPs), obtain training on indoor air quality and sampling for and interpretation of bacteria and mold in indoor environments.

The American Industrial Hygiene Association (AIHA) [<https://www.aiha.org/>], American Conference of Governmental Industrial Hygienists (ACGIH) [<https://www.acgih.org/>], and American Council for Accredited Certification (ACAC) [<https://www.acac.org/>] provide this training.

Environmental Assessment

The first step in most mold investigations should be to take a building history. Answers to important questions like age of the building, age of the roof, construction history, history of water damage (leaks/floods), and maintenance history helps the IH/IEP and mold abatement contractor gain a larger picture about the building and may impact sampling and/or remediation strategies.

During the initial walkthrough, emphasis should be placed upon looking for evidence of water damage, because this is where mold is likely to be found. Taking note of musty, moldy odors is often a good way to begin an investigation and head towards the direction of the source of the odor (mold). As the basic tenets note (page 1), the source of the water should be found and stopped immediately, moldy materials should be removed and replaced (if porous), the area should be dried, and abatement should take place according to these guidelines.

Decisions about appropriate remediation strategies are not always reliably made based upon visual inspection alone. Mold may be growing in places that are not readily observable, such as on the reverse side of wallboard panels, inside of wall cavities, and inside of HVAC systems. This is what is often referred to as “hidden mold.” Hidden mold should be remediated along with mold that is readily visible. Other tools in addition to our senses of sight and smell may be employed to alert the mold abatement contractor to the presence of hidden mold. Some of these are discussed briefly below.

It is important to keep in mind that dampness and mold growth inside a building could pose a health hazard to occupants. Whether there are health risks depends on exposure and on allergic sensitization of individuals. The large number of mold species and strains and the large inter-individual variability in human response to mold and dampness exposure preclude the derivation of exposure limits that can be used to assess the presence or magnitude of health risks to building occupants who are exposed to dampness and mold.

1. Visual Inspection

Visual inspection of the property may be conducted by the mold abatement contractor, third-party consultant (IH/IEP), or both. According to the NYC *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, “visual inspection is the most important initial step in identifying a possible contamination problem. The extent of any water damage and mold growth should be visually assessed. This assessment is important in determining remedial strategies. Ventilation systems should also be visually checked, particularly for damp filters but also for damp conditions elsewhere in the system and overall cleanliness. Ceiling tiles, gypsum wallboard (sheetrock), wallpaper, cardboard, paper, and other cellulosic surfaces should be given careful attention during a visual inspection. The use of equipment such as a borescope, to view spaces in ductwork or behind walls, or a moisture meter, to detect moisture in building materials, may be helpful in identifying hidden sources of fungal growth and the extent of water damage.” Thermal imaging can also be used to look for gaps in insulation and can be useful in predicting areas in the building where condensation will likely form, areas susceptible to freeze/thaw cycles, etc. If dampness/high humidity is a possible cause, a hygrometer should be used to measure relative humidity.

2. Bulk/Surface Sampling

Bulk or surface sampling is usually not necessary and should not be done indiscriminately. It should only be undertaken when the sampling results have the potential to add useful information. Such sampling is seldom needed for relatively small jobs such as those in homes and other residential settings. If samples are collected, it is important that the right kind of sample is collected and analyzed with the appropriate method that will yield meaningful results.

DPH recommends the following:

- Do not collect samples if you don't know how to interpret the results.
- Do not collect samples if the results will not add any useful information.
- If you do collect samples, always call an American Industrial Hygiene Association (AIHA) Environmental Microbiology Laboratory Accreditation Program (EMLAP) accredited lab to discuss the type of information that you hope to gain, and check to make sure that the particular sampling method you are planning to use will give you the information you need.
- Do not sample if the results will not affect your remediation plan.

For more information about testing, refer to the CT DPH fact sheet, [Should I Test My Indoor Air?](#)

3. Air Monitoring

- a. The same caveats mentioned above for bulk and surface samples apply to collecting air samples for fungi. Samples should not be collected indiscriminately, but by an IH/IEP to support or refute a hypothesis. Such sampling is seldom needed in homes or other residential settings. Professional judgment based upon experience and training should guide the IH/IEP who uses air sampling judiciously as a tool. Communication with an AIHA EMLAP accredited laboratory is highly recommended before samples are collected. This is to ensure that the proper collection and analytical methods will be used on a particular job to yield meaningful results for the project.
- b. There are no health-based standards for comparison with any air samples collected for microbial agents. Data must be evaluated by an IH/IEP within the context of the entire investigation. Decisions about whether to clean/remediate are almost never made based solely upon air monitoring data.
- c. Air monitoring may be useful if the presence of mold is suspected (e.g., musty odors) but cannot be identified by visual inspection due to hidden mold, or colorless or light-colored fungi which may not be visible to the naked eye, or bulk sampling (i.e., bulk sampling for hidden mold). The purpose of such air monitoring is to aid in determining the location and/or extent of contamination.
- d. Air monitoring may be necessary if there is evidence from a visual inspection or bulk sampling that ventilation systems may be contaminated. The purpose of such air monitoring is to assess the extent of contamination throughout a building. It is preferable to conduct sampling while ventilation systems are operating.
- e. If air monitoring is performed, for comparative purposes, outdoor air samples should be collected concurrently at a building supply air intake if possible, and at a location representative of outdoor air. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists' book, *Bioaerosols: Assessment and Control*.
- f. Post-remediation sampling results are almost never zero. This is because mold is everywhere. Even after a thorough cleaning, some mold normally found outdoors will likely migrate into the area as soon as the remediation is complete. The goal of remediation stated in S520 is to return a site rated as a Condition 2 or 3 site to that of Condition 1 site (normal fungal ecology). Refer to the Remediation section (page 6) of this document for definitions.

4. Analysis of Environmental Samples

DPH recommends the use of laboratories accredited by AIHA's EMLAP to analyze viable and non-viable air samples and bulk/surface samples for bacteria and fungi in indoor environments. Participation in EMLAP ensures that the lab uses documented quality control procedures and participates in quarterly proficiency testing.

There are some specialty procedures that the IH/IEP may choose, because they feel that they may add information that cannot be obtained from culturable or spore trap sampling, or bulk or swab sampling. Some of these specialty procedures include QPCR (quantitative polymerase chain reaction), ergosterol as a measure of fungal biomass (for large-scale buildings and research projects), and endotoxin (for gram negative bacteria, which may also be present during floods). Laboratories with a great deal of experience should be used to perform these analytical procedures. They are often university, government, or research laboratories.

Remediation

The goal for remediation should be:

- To eliminate visible mold
- To reduce hidden mold
- To restore the microbial composition to that normally found in ambient outdoor and non-affected indoor areas.

1. Factors to Consider When Planning Mold Abatement

Indoor mold problems arise from water problems. *Knowing whether the water problems are chronic or a one-time occurrence, helps inform how the remediation project will be designed and executed.*

An interdisciplinary approach is often required in order to perform mold abatement. For example, Heating, Ventilation, and Air-Conditioning (HVAC) engineers, hospital infection control practitioners, and facilities engineers may all be a part of the remediation planning team depending upon the setting.

Note that other types of abatement work (i.e., lead and asbestos abatement) often include water sprays and/or misting for dust control. However, on mold abatement projects, an important goal is to dry out the environment to prevent mold from propagating. Professional judgment must be used based upon training and experience when deciding upon the best method(s) for dust control on a mold abatement job, but consideration should be given to HEPA (high efficiency particulate air) vacuuming in place of, or in conjunction with, the judicious use of light misting to suppress dust in the work area. Refer to the most recent edition of S520 for more information.

2. Determining Scope of Work

The most common method for determining the scope and safety precautions to be used in a mold abatement project is to estimate the size of the contaminated area by visual inspection. This method is used in both the NYC and EPA guidelines. Size of contamination, however, should not be the only consideration for the following reasons:

- It does not take into account the possible presence of hidden mold. If the water caused a significant amount of damage, and the area remained wet/damp for more than 48 hours, there is a good likelihood that mold is growing in both places that are visible and behind/inside visible areas (such as wall cavities, attics, crawl spaces, etc.).
- The “size of contamination” concept alone does not take into account special populations/settings such as hospitals, nursing homes, rehabilitation facilities, same-day surgery centers or other medical treatment facilities, or private residences where a chronically debilitated patient lives.

Rather than relying upon “size of contamination” for project planning, the IICRC’s S520 [voluntary] *Standard and Reference Guide for Professional Mold Remediation* uses the terms *Conditions 1, 2, and 3* to define indoor environments relative to mold. A table comparing/contrasting this approach with the size of contamination approach described in the [NYC Guidelines](#) is presented below.

IICRC S520	NYC Guidelines (Note: The NYC guide refers to active growth.)
<u>Condition 1 (normal fungal ecology):</u> An indoor environment that may have settled spores, fungal fragments or traces of actual growth whose identity, location, and quantity are reflective of normal fungal ecology for a similar indoor environment.	N/A
<u>Condition 2 (settled spores):</u> An indoor environment that is primarily contaminated with settled spores that were dispersed directly or indirectly from a Condition 3 area, and which may have traces of actual growth.	N/A
<u>Condition 3 (actual growth):</u> An indoor environment that is primarily contaminated with the presence of actual mold growth and associated spores. Actual growth includes growth that is active or dormant, visible or hidden.	<u>Level I: Small Isolated Areas</u> (10 square feet or less) - e.g., ceiling tiles, small areas on walls. <u>Level II: Mid-Sized Isolated Areas</u> (10 - 30 square feet) - e.g., individual wallboard panels. <u>Level III: Large Isolated Areas</u> (30 - 100 square feet) - e.g., several wallboard panels. <u>Level IV: Extensive Contamination</u> (greater than 100 contiguous square feet in an area)
<u>IICRC S520:</u> HVAC Remediation	<u>Level V: Remediation of HVAC Systems</u>
<u>IICRC S520:</u> Contents Remediation	<u>Contents Remediation – Not Covered</u>

DPH recommends that mold abatement contractors employ the IICRC S520 method to describe the scope of their remediation project.

Although the majority of technical procedures and practices recommended by DPH are covered in S520, there are several specifics that warrant special attention:

- When performing structural remediation, the contaminated area must be isolated from non-contaminated areas to prevent cross-contamination. This usually involves building a barrier or containment structure, usually made with polyethylene sheeting. The containment structure should be checked to make sure that it does not leak, is strong enough to withstand the number of negative air machines that will be placed inside, and if pressure differentials are lost, containment flaps will close so that contaminated materials remain inside of the structure. Experience and training will help guide the contractor regarding size and construction of containment, but be prepared to expand the containment structure if additional mold is found (i.e., hidden mold), and the scope of the project is expanded.
- If abrasive tools are to be used, the abatement contractor should establish HEPA filtered negative air in the workspace. This limits the potential spread of contamination.
- *“Physically removing mold contamination is the primary means of remediation.”* This means that it is not acceptable to simply spray a product over mold to cover it up. Indiscriminate use of antimicrobial products, coatings, sealants, and cleaning chemicals is also not recommended. They may be used as complimentary tools on certain surfaces *after the mold has been removed*.
- Mold resistant coatings/sealants should not be sprayed on top of actively growing mold.
- Fungicidal coatings (those rated to kill mold) should not be used as sealants or encapsulants on active, viable mold.
- The use of antimicrobial agents in the form of fogging agents is not recommended for mold remediation in buildings. These are gas or vapor-phase antimicrobials that, by the nature of the delivery system, do not offer enough concentration and contact time to be effective at killing mold. Other problems include toxicity, inefficient capture rate, and the fact that physical removal is still necessary after fogging.
- Biocides may play an important role in treating indoor environments flooded with raw sewage, where pathogens could be present.

3. Remediation of Heating, Ventilation, and Air-Conditioning (HVAC) Systems

IICRC's S520 covers the remediation of HVAC systems and refers to the National Air Duct Cleaners Association's (NADCA) document, *Assessment, Cleaning, and Restoration of HVAC Systems*. This NADCA document has become an industry standard. CT DPH recommends that mold abatement contractors engaged in remediation of HVAC systems follow S520 thoroughly and refer to the NADCA document for further technical information.

As mentioned above, the majority of technical procedures and practices are covered in S520 that DPH recommends mold abatement contractors follow. However, there are a few key points that warrant special attention:

- Isolating HVAC components from other parts of the building that are undergoing abatement is recommended.
- Use of biocides in HVAC systems is discouraged. If there is a fungal infestation inside of ducts or other HVAC components, *the mold must be physically removed*. It is not appropriate to spray antimicrobial products, coatings, sealants or encapsulants on top of viable or non-viable mold in HVAC systems.
- Use of coatings and sealants prophylactically, (during new installation or new construction) or as a final treatment post-remediation as a lockdown for residual particulate and to provide a smooth, clean surface to deter future fungal activity may be of some value.

4. Health and Safety, Hazard Communication

S520 refers to pertinent OSHA Standards for occupational health concerns, including the OSHA General Duty Clause, Emergency Action and Fire Protection Plans, PPE, Respiratory Protection, Asbestos, Lead, Heat Disorders and Health Effects, Confined Spaces, Hazard Communication, Lockout/Tagout, Fall Protection, Noise Protection, and Scaffolds. All OSHA standards should be followed during any remediation work.

Contractors involved in mold abatement are likely to encounter asbestos and lead on the job at some point. DPH has specific regulations for each of these substances. Mold abatement contractors must follow all state regulations pertaining to asbestos and lead. For further information, see contact information below. The DPH mold website is <https://www.ct.gov/dph/mold>.

[DPH Asbestos Program](#) (860) 509-7367

[DPH Lead Program](#) (860) 509-7299

Conclusions

In this document, DPH has provided recommended guidelines for contractors performing mold abatement. Readers should refer to the *IICRC S520* and *NYC Guidelines on Assessment and Remediation of Fungi in Indoor Environments* for more detailed technical recommendations for most of the technical and procedural specifications needed to perform mold abatement work in a manner that protects building occupants, the abatement workers themselves, and the building structure.

For further information regarding this document, please contact the Connecticut Department of Public Health at (860) 509-7740 or visit our mold [website](#).

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