CHANGE THE AIR FOUNDATION

MOLD REMEDIATION AT A GLANCE

By Kendra Seymour, NCMP, NCRSI

"**Mold Remediation at a Glance**" is meant to be a consumer-friendly, general *overview* of best practices for mold remediation as shown in **Step 2 & 3** of the diagram below. It is **not** a do-it-yourself manual, nor does it cover every detail or scenario that needs to be considered. Before beginning remediation, be sure to work with a knowledgeable Indoor Environmental Professional (IEP) as referenced in **Step 1**. To start at Step 1, visit our **"Start Here"** tab at ChangeTheAirFoundation.org.

A word of caution: In many states, the person who is remediating your home is *not* bound by any professional licensing, certifications, or legal requirements. Unfortunately, ineffective, insufficient, and unsafe practices are commonplace. Just because a company remediates mold does not mean they know how to do so safely, nor does it mean they will follow the general process discussed in this guide. Before hiring a remediation company, download our free resource, "**Questions to Ask When Hiring a Remediation Company.**"

"**Mold Remediation at a Glance**" provides an *overview* of what should occur during **Step 2 & 3** of the inspection and remediation process.

Important Note: No two remediation projects are the same. There are many important details and variables that must be considered for each unique situation. That said, there are a few key points to keep in mind for any remediation project:

- *Mold remediation is about **removal**, not covering, spraying, fogging, or encapsulating fungal growth!*
- *Both **mold growth** and any **byproducts** produced by the growth need to be safely removed.*
- *The **moisture source** must be corrected, and the materials dried, or the problem can return.*

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BEFORE YOU REMEDIATE:

A HELPFUL ANALOGY FOR UNDERSTANDING HOW MOLD IS LIKE A FACTORY

Mold is like a factory. When people are working inside a factory, smoke may be produced. This smoke is a byproduct that **cross-contaminates** and pollutes the surrounding air.

The same idea is true for mold. As an active **mold colony** is growing, it releases **byproducts** into the environment. Instead of smoke, the byproducts can include mold spores, fungal fragments, mycotoxins, microbial volatile organic compounds (mVOCs), etc. These invisible pollutants can travel throughout your home and settle on surfaces.

You can keep fighting to remove the "smoke" produced by these mold factories (a losing battle), or you can stop the air pollution for good by shutting down the mold factory.

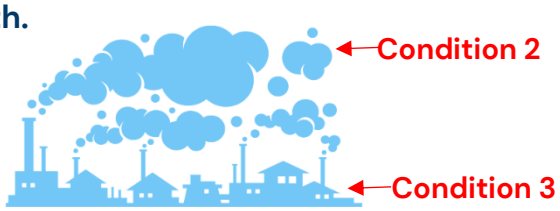
Unfortunately, shutting down the mold factory doesn't mean that the residual air pollution disappears. Once the mold byproducts are released, they remain in the indoor environment until removed.

Good remediation involves safely removing the mold growth and all the byproducts (spores, fungal fragments, mycotoxins, etc.) produced by that growth.

Think if it this way:

Step 1: *Shut down the factory.*

Step 2: *Clean up byproducts made by the factory.*



(See industry terms below)

Sadly, most remediation only focuses on mold growth and ignores the cross-contamination. Even though spores, fungal fragments, and mycotoxins are not living, they still may pose a health risk to people and animals and should be safely removed.

In industry terms, the Institute of Inspection Cleaning and Restoration Certification (IICRC) identifies three mold conditions for which an indoor environment can be categorized.

Condition 1: Normal fungal ecology

An indoor environment that may have settled spores or fungal fragments that are to be expected within a similar indoor environment. Simply put, the samples do *not* indicate a source of mold growth in the home.

Condition 2: Settled spores or fungal fragments

An indoor environment that is contaminated with settled mold spores or fungal fragments as a result of a Condition 3 situation. There are elevated spore counts not because the area is a *source* of mold growth, but because it has been impacted by a *nearby* area of growth. This is sometimes referred to as cross-contamination.

Condition 3: Actual mold growth

An indoor environment that is contaminated with actual mold growth, spores, and fungal fragments. Growth can be active, dormant, visible, and/or hidden.

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.1: Personal Protective Equipment | Step 2.2: Proper Engineering Controls | Step 2.3: Controlled Demolition & Removal | Step 2.4: Detailed Cleaning

Step 2.1: Personal Protective Equipment

What is it?

Personal protective equipment (PPE) is worn head to toe by the workers during the remediation of mold sources to protect them from the negative health effects caused by mold, water damage, and other microbial growth.

PPE is put on and taken off inside the decontamination chamber (*see p. 4-6*) and includes:

- Full body protective suit (coveralls including booties and hood)
- Eye protection
- Gloves
- Boots
- Respiratory protection (i.e. full face P100 respirator, properly fitted, and in good working order)
- Other: Hard hats, ear plugs, etc., as necessary for the specific task.

Why is it important?

PPE is a critical component of protecting the health and safety of the worker and protecting the structure from cross-contamination.

Mold is microscopic. The average mold spore ranges between 3 and 10 microns. In general, the human eye can't see anything below 40 microns. This means by the time you can see mold growth, there are already a lot of mold spores present.

To put it into perspective, it has been estimated that up to 400,000,000 spores of Penicillium can cover an area that is 2.5 cm in diameter. That is a lot of mold for an area that is roughly the size of a quarter. Further, for every one mold spore, there can be as many as 500 fungal fragments.

If a company won't properly protect its workers, chances are they won't protect you or your home either.

*Your remediator should look like this. Anything less is **not** protecting the worker.*

*As many as **400,000,000** spores of Penicillium can cover the area the size of a quarter.*

Note: You may not see workers in PPE. Workers put on and take off PPE inside the decontamination chamber (see p. 4-6) in order to minimize cross-contamination of the rest of the home.

Question for your remediator: *What PPE do your workers use?*

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.1: Personal Protective Equipment | **Step 2.2: Proper Engineering Controls** | Step 2.3: Controlled Demolition & Removal | Step 2.4: Detailed Cleaning

Step 2.2: Proper Engineering Controls

What is it?

Proper engineering controls include things like **containment** and establishing and maintaining proper **pressure** (usually negative pressure) using **HEPA-filtered air filtration devices (AFD).**

Containment is a way to separate contaminated areas with mold growth and water damage from the rest of the home or building. It should consist of a minimum of two "rooms" (a **main chamber** built around the source area and a **decontamination chamber**, or **"decon" chamber**) constructed using **6 mil plastic** (*see diagram p. 6)*. This plastic should cover unaffected areas and items like walls, floors, cabinets, and all penetrations including windows, doors, HVAC vents, outlets, drains, etc.

There should be no gaps or tears in containment. All seams of containment are sealed, except where necessary such as a single point of entry/exit, designated **makeup air**, etc. A filter may be placed in the plastic sheeting to allow for makeup air so that the containment does not collapse when it's under negative pressure.

The HVAC system and ductwork should be sealed and may need to be turned off during remediation. Work with your IEP and remediator to determine if and when to clean the system and if alternate means of heating and cooling are needed if the system is shut off.

Containment should be built as small as possible but as big as necessary. If it is too small, workers may not have enough space to work. If it is too large, it uses extra materials and will take longer to clean during Step 4.

Containment uses materials such as:

- 6 mil plastic
- Zipper doors
- Heavy duty tape
- Poles, foam rails, or other support to keep the containment from falling

Diagram of Containment

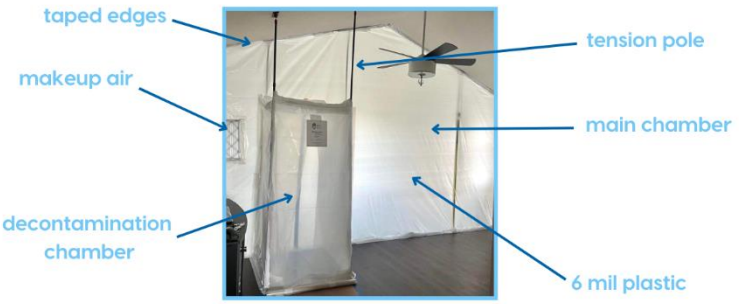


Photo credit: Jessica McQuade

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.1: Personal Protective Equipment | **Step 2.2: Proper Engineering Controls** | Step 2.3: Controlled Demolition & Removal | Step 2.4: Detailed Cleaning

Step 2.2: Proper Engineering Controls

What is it? ***(continued)***

HEPA-filtered Air filtration devices (AFDs) are used once containment is tightly built and sealed. AFDs will be used during controlled demolition and removal (*Step 2.3*) and during detailed cleaning (*Step 2.4*). Their purpose is to control and reduce contamination (spores, fungal fragments, mycotoxins, etc.) and other particulates (drywall dust, silica, etc.) that are kicked up into the air during remediation.

There are **two** ways to use an AFD: as an **air scrubber** or as a **negative air machine (NAM)**. Ideally, both are in place (when space permits), but priority is given to the use of the negative air machine.

Air Scrubber	Negative Air Machine (NAM)
• Rapidly filters the air inside containment (like a high-powered air purifier). • It is typically not connected to any additional materials, but may be connected to "tails," which can serve to agitate the air, further allowing particles to be removed. • It does **not** create negative pressure on its own. • ***Caution:*** *Many remediation companies make the mistake of using an AFD **only** as an air scrubber. Remember, an air scrubber on its own does **not** create negative air pressure!*  *Photo credit: Jessica McQuade*	• An air scrubber can be converted to a NAM by attaching plastic tubing to the exhaust side of the AFD, which vents the air from inside the containment out of a designated opening. This creates **negative air pressure** inside. • Keeps particles from spreading outside of the containment as work is being done, and as workers enter/exit containment. • Typically, containment is negatively pressurized (around -5 pascals). Pressure can change throughout a remediation project and should be monitored the *entire* time (using a tool such as a **manometer**). When negative pressure is achieved, plastic sheeting will bow slightly into the containment.  *Photo credit: John Fusco*

Important Note: Containment, NAMs, and air scrubbers will remain up and on during the entire course of the project until **post-remediation verification (PRV),** also known as clearance testing, is done by a third party *and* the area has passed testing. Your IEP may request air scrubbers be temporarily turned off one or more hours prior to testing. Never turn off equipment unless specifically instructed to do so. Once the area has passed testing, these engineering controls are removed.

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.1: Personal Protective Equipment | **Step 2.2: Proper Engineering Controls** | Step 2.3: Controlled Demolition & Removal | Step 2.4: Detailed Cleaning

Step 2.2: Proper Engineering Controls

Why is it important?

Using *both* **proper containment** and **air filtration devices (AFDs)** is a critical part of the remediation process. Because containment alone will not keep 100% of spores, fragments, mycotoxins, and any other particles from leaving the area, proper pressure and filtration are needed to help reduce contamination and exposure both inside and outside the containment. Further, your remediation company should clean any equipment between jobs to reduce cross-contamination from one to job to another.

Tip: Ask to see a diagram or sketch in your contract of where engineering controls like containments will go, where the NAM will vent, etc.

Photo credit: Jessica McQuade

Photo credit: John Fusco

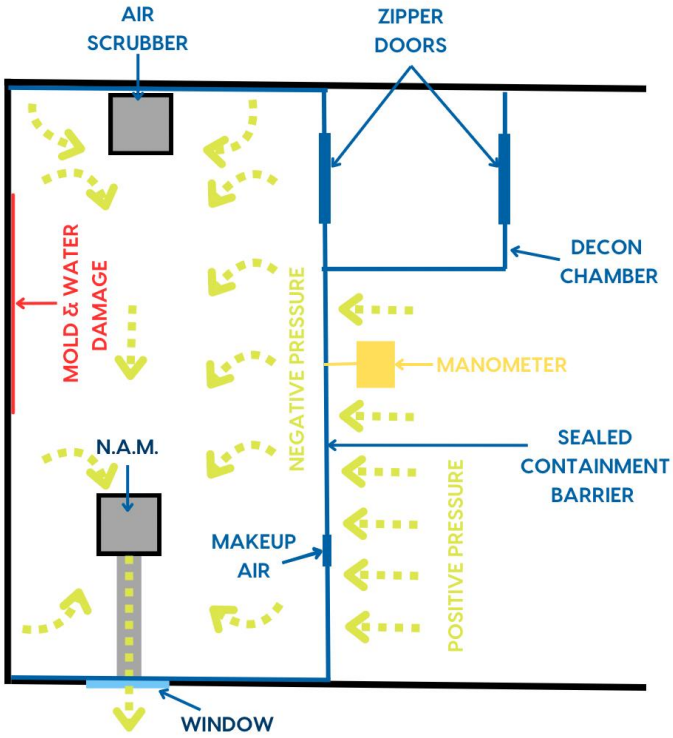


Photo credit: Jessica McQuade

Photo credit: Jessica McQuade

Important Note: Proper engineering controls remain up until after post testing is completed and the area passes testing. No unauthorized personnel should enter the containment at any time, even after workers have gone home for the night. Doing so risks cross-contaminating inside and outside the containment and may void any post testing guarantees made by the remediation company.

Questions for your remediator: *When and how do you establish and maintain proper pressure?*

When and how do you use an air scrubber?

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.1: Personal Protective Equipment | Step 2.2: Proper Engineering Controls | **Step 2.3: Controlled Demolition & Removal** | Step 2.4: Detailed Cleaning

Step 2.3: Controlled Demolition & Removal

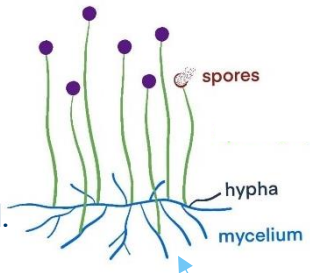


Diagram of a Mold Colony

What is it? Controlled demolition and removal is the critical time in which moldy and water-damaged building materials are removed or cleaned.

Building material that cannot be salvaged may include drywall, insulation, carpet, porous material, and sometimes wood. Materials should be removed a minimum of 18"-24" beyond what is visibly moldy or water damaged. This helps to ensure that any growth that is not yet visible is also removed.

Items that are removed should be doubled bagged and closed using the "gooseneck" technique. The outside of the bags should be wiped before being removed from containment and taken directly outside to reduce the chance of cross-contamination of the non-work areas.

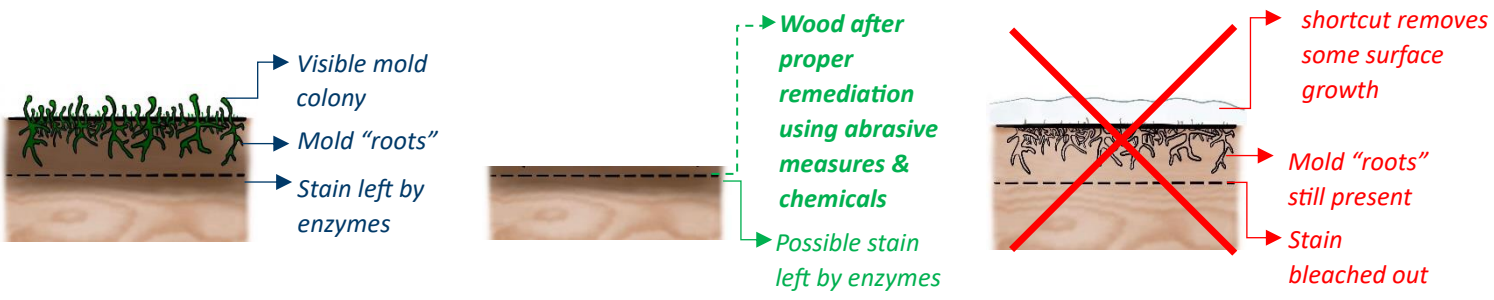
A "clean as you go" mentality should be adopted, and HEPA vacuums should be used to assist in this process to minimize debris along the way.

Building materials that can be saved (like solid wood) require special attention such as HEPA vacuuming, damp wiping with *antimicrobials and surfactants, *and* the use of abrasive measures. **Abrasive measures** are critical to removing *all* parts of mold growth, including "roots" (hyphae & mycelium structures) that may have grown into a material. ***Note:*** *Staining may be left behind even after roots are removed. A surface sample can confirm that growth is fully gone.*

Abrasive measures may include:

- **Sanding**
- **Wire brushing**
- **Soda blasting**

Note: Harsh chemicals are almost never needed. Please read "A Special Note: Chemicals & Remediation" on pages 14-16.



Diagrams adapted from and shared with permission of Valor Mold Removal.

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.1: Personal Protective Equipment | Step 2.2: Proper Engineering Controls | **Step 2.3: Controlled Demolition & Removal** | Step 2.4: Detailed Cleaning

Step 2.3: Controlled Demolition & Removal

What is it? ***(continued)***

Before beginning work, be sure you and your remediation company agree about what building materials can and cannot be saved. The table below provides a general overview of how to categorize building materials with mold *growth* and was adapted from Michael Pinto's *Fungal Contamination: A Comprehensive Guide to Remediation*.

Assessment Chart for Contents From a Mold-Impacted Environment

Type of Material	*Visible Growth*
Porous- *Fabric, paper, upholstered furniture, ceiling tiles, drywall, etc.*	*Disposal and replacement unless high value, then specialized restoration.*
Semi-porous- *raw wood, studs, rafters, decking, unpainted cinder block, other masonry components, stucco, etc.*	*Disposal and replacement if structural damage or significant rot; scraping, scrubbing, sanding, or abrasive blasting of surface contamination.*
Non-porous- *metal, plastic, glass, sealed wood, etc.*	*HEPA vacuuming, scrubbing, wiping, immersion washing, using ultrasonic bath, power washing, air washing, air blasting, or steam cleaning.*

Why is it important?

Mold must be *removed*. Spraying, fogging, killing, encapsulating, and painting over mold *in place of* source removal is often insufficient. Encapsulants and paints can fail, and "dead" or dormant mold is still a health hazard.

Be sure material adjacent to visible mold is properly investigated. This may mean removing walls and flooring to reveal hidden microbial growth.

Be sure to identify and correct the moisture source or the problem is likely to come back.

Questions for your remediator: *How do you remove moldy material from containment?*

How do you decide what material to keep and what to remove?

What abrasive measures do you use?

STEP 2 OF THE INSPECTION & REMEDIATION PROCESS

Step 2.4: Detailed Cleaning

What is it?

Detailed cleaning, sometimes known as **small particle cleaning**, is the last and one of the most overlooked parts of the process. Even when workers clean as they go and use air filtration devices (AFDs), mold spores, fungal fragments, mycotoxins, and other particles may have landed on both horizontal *and* vertical surfaces. The **cross-contamination** caused by these particles (both visible and invisible) needs to be removed.

Every square inch inside the containment is meticulously cleaned through a very strategic and labor-intensive process. This is often the most time-consuming and expensive part of the whole process. It typically involves a process known as a "HEPA Sandwich" or a "HEPA Pizza" which consists of:

- **HEPA vacuuming**
- **Damp wiping with an *antimicrobial, surfactant, and microfiber cloths**
- **HEPA vacuuming or dry wiping again with microfiber cloths**

All surfaces are cleaned – ceilings, walls, floors, door frames, pipes, baseboards, windows, plastic sheeting, etc. Where the cleaning starts, how it is done (i.e. directions of HEPA vacuuming and wiping) is important in order for the removal to be as effective as possible and reduce cross-contamination as areas are cleaned. Be sure to ask your remediation company for specific details on this process. When they are done there should be no visible debris (dust, dirt, trash, etc.) left inside the containment.

"HEPA Sandwich/ Pizza"

HEPA Vac.

Damp wipe

HEPA Vac. or wipe again

Harsh chemicals are almost never needed. Please read "A Special Note: Chemicals & Remediation" on pages 14-16.

Why is it important?

Mold is microscopic. HEPA vacuuming is needed to remove bulk debris and particles like spores, fragments, and mycotoxins from inside the containment.

For the tiniest particles, damp wiping is needed to break the sticky bond these contaminants have on surfaces and to overcome the electrical charge between particle and material.

Failure to remove this cross-contamination may pose continued health risks to people and pets living in the home or building.

Question for your remediator: *What does your cleaning process inside containment entail?*

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STEP 3 OF THE INSPECTION & REMEDIATION PROCESS

Post-remediation verification (PRV), informally known as post testing or clearance testing, is an important part of determining if remediation was successful. As tempting as it may be to skip this step and save money, don't do it! It is not enough to simply remove *visible* growth. You want to confirm with testing that it is actually gone at a microscopic level. It is also important to confirm with a moisture meter that buildings materials are dry *prior* to rebuild.

Further, there are no required thresholds regulating the amount of mold or bacteria that is safe for an indoor environment. Simply put, there is no standard (federal, health, or otherwise) that says that "X" amount of a mold or bacteria is safe or acceptable while "Y" amount is not.

As a result, you will want to work with your Indoor Environmental Professional (IEP) and remediator prior to starting remediation to determine what constitutes a "pass" or "fail." At a *minimum*, a "pass" should meet the criteria listed on page 11-12.

Reminder: Do NOT remove engineering controls like containment and air filtration devices until *after* PRV has confirmed the remediation has passed.

Three Components of Post-Remediation Verification:

1. Visual inspection and moisture measurement
2. Air testing
3. Surface sampling

At a minimum, a "pass" should meet the criteria on p.11-12.
Please note alternative criteria exists for unoccupied spaces such as crawlspaces and attics.

Conflict of Interest
PRV should be done by a third party. Generally, the person doing the remediation should **not** do the PRV. It's a potential conflict of interest!

Contract Tip
Agree ahead of time and in writing what constitutes a "pass" or "fail." If the PRV fails, the remediator should come back and reclean or re-remediate the area at no additional cost!

Zero Tolerance Molds
Stachybotrys
Fusarium
Trichoderma
Memnoniella
Chaetomium

Important Note: Your remediation contract should include important details such as who can perform PRV, when it can be done (within "X" number of days of completion, etc.), what conditions are required (air scrubbers on/off during testing, etc.), and most importantly, what constitutes a "pass" or "fail". To learn more, download our resource on "**Remediation Contracts**" at ChangeTheAirFoundation.org/free-downloads.

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STEP 3 OF THE INSPECTION & REMEDIATION PROCESS

The criteria on pages 11-12 is suggested **post-remediation criteria** for when spore trap air samples are collected. This criteria was copied and shared with permission from Wonder Makers Environmental. Please note that the criteria for **occupied living spaces** such as a family room, kitchen, laundry room, bathroom, basement, or general living area is *different* from criteria for **unoccupied living spaces** which includes attics and crawlspaces.

Post-Remediation Evaluation Criteria for Mold Contamination: Occupied Living Spaces
Visual Inspection
1. Were the specifications followed? Was the moisture source identified and corrected? Were the contents and debris removed? Was all visible mold removed? Was the work area white-glove dust free?
Total Spore Concentration
2. Is the total spore concentration less than 2,000 c/m³ (typical of a normal fungal ecology)? If less than 800, go to step 4.
Comparison to Make-up Air Source
3. Is the total spore concentration on the work area sample below that on the comparison sample? *Comparison sample collected from out-of-doors or inside (but outside work area), depending on location of containment entry point.*
Rank/Order Comparison
4. Is the level of each fungal type (and hyphae) recovered from the work area less than 100 c/m³ above the level of the same fungal type (and hyphae) on the comparison sample?
Indicator Organisms
5. Were Aspergillus/Penicillium-like spores on the work area sample less than 200 c/m³?
Target Organisms
6. Was the work area sample free of target fungal types, both counted and observed? *Zero tolerance of Stachybotrys sp., Fusarium sp., *Trichoderma sp., Memnoniella sp., Chaetomium sp.* **Trichoderma spores are not always distinguishable on spore trap samples using brightfield light microscopy.*

Source: Copied and shared with permission from Wonder Makers Environmental, 2004

Occupied living spaces include bathrooms, family rooms, basements, or other general living areas.

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STEP 3 OF THE INSPECTION & REMEDIATION PROCESS

Post-Remediation Evaluation Criteria for Mold Contamination: Unoccupied Living Spaces
Visual Inspection
1. Were the specifications followed? Was the moisture source identified and corrected? Were the contents and debris removed? Was all visible mold removed? Was the work area white-glove dust free?
Total Spore Concentration
2. Total concentration of fungal material on work area sample is below 800 c/m³, or equal to or below out-of-doors comparison sample.
Rank/Order Comparison
3. The level of each fungal type and hyphae recovered on the work area sample is less than 100 c/m³ above the comparison levels.
Indicator Organisms
4. Aspergillus/Penicillium-like spores on the work area sample are below 500 c/m³, or if above equal to or below the outdoor.
Target Organisms
*5. The work sample area recovered no target fungal types (Stachybotrys sp., Fusarium sp., *Trichoderma sp., Memnoniella sp., Chaetomium sp.).*
**Trichoderma spores are not always distinguishable on spore trap samples using brightfield light microscopy.*

Source: Copied and shared with permission from Wonder Makers Environmental, 2004

***Un*occupied living spaces** include attics and crawlspaces.

Important Note: If post-remediation sampling other than spore trap air samples is used, a clear understanding of how to interpret the sample results is still necessary and should be determined prior to the start of remediation. Everyone-you, the remediation company, and the IEP should be able to review the lab data and know that work was completed successfully.

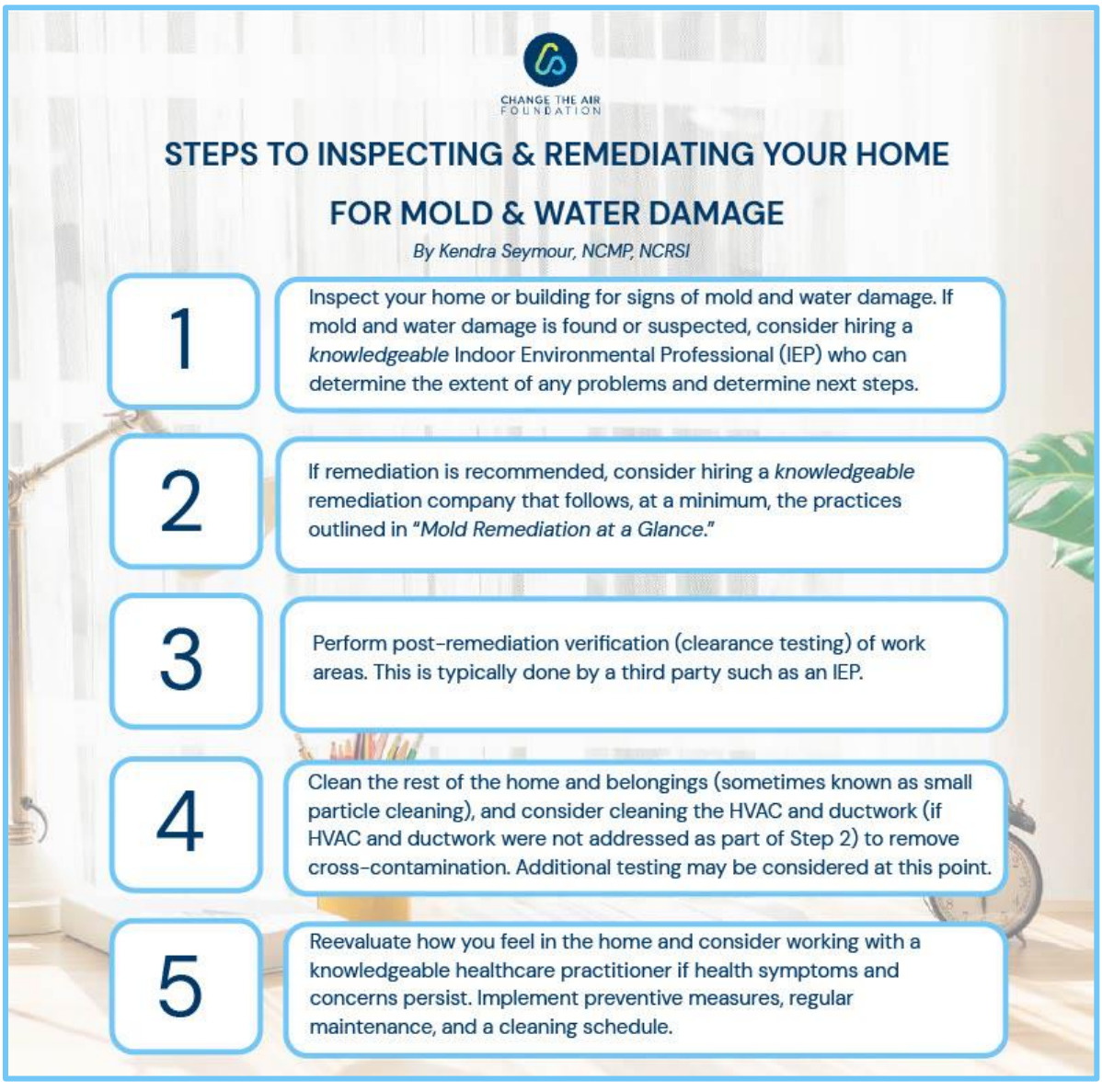
NEXT STEPS AFTER REMEDIATION

Once you've successfully completed **Step 2** and **Step 3**, your project may not be over just yet.

It's now time to think about the rest of your home in **Step 4**. Remember how mold is like a factory? While you have hopefully removed any **mold growth** (*Condition 3*), it's important to make sure you have removed any **byproducts** (*Condition 2*) that may have traveled throughout your home on air currents, people, pets, and belongings.

This can mean cleaning your HVAC system and ductwork if it wasn't addressed as part of Step 2. It also often involves cleaning the rest of the home and belongings. Just like the smoke in our factory analogy, you want to remove any cross-contamination from mold spores, fungal fragments, and mycotoxins that may have been left behind because they may continue to pose a health risk.

For additional free resources on each of these steps,
*please visit our **"Start Here"** tab at **ChangeTheAirFoundation.org***



A SPECIAL NOTE: CHEMICALS & REMEDIATION

Key questions to ask about chemical usage during remediation:

1. Is the chemical safe?

Harsh chemicals like ozone, bleach, ammonia, and even many mold "killing" products can pose a health risk to workers and occupants during and after application as a result of odors and residues that remain behind. Sensitive clients may request a sample of the product ahead of time to see if the product can be tolerated. Additionally, ask to see the complete product label so you can verify the product is going to be used in a manner consistent with the directions and recommendations on the label. This includes using proper application techniques, ventilation requirements, personal protective equipment, etc. For example, if a product is not designed and registered to be used in your HVAC ductwork, do not allow the company to spray it into your ductwork where it is unable to be removed and building occupants may be exposed to the chemical when the system is turned on.

2. Is the chemical effective?

Many chemicals are designed to work only on certain surfaces under certain conditions. For example, a chemical that is effective on nonporous material like glass or metal may not be effective on semi-porous material like wood. Some chemicals need a certain amount of "dwell time," meaning they need to remain on the material for a certain period of time. Ignoring the dwell time may result in the chemical not working as advertised. Other chemicals, like certain paints and encapsulants, may only be effective on clean and dry material. In order for a chemical to work as intended, it has to be used in the manner described on the label. Always ask to see the complete product label to verify the product is going to be used in a manner consistent with the product recommendations.

3. Is the chemical needed?

Chemicals play an important role in remediation. However, they are sometimes, used to cover sloppy, lazy, ineffective practices. For example, some companies will encapsulate or paint mold instead of fully removing it. Because encapsulants can fail, it is important to confirm via post-remediation verification (PRV), that mold is gone *before* encapsulants are applied. Another example involves companies that simply spray mold, claiming it is no longer a threat because it's "dead" or because the appearance of mold growth has been removed (often a result of the bleaching effect caused by certain chemicals). This method of mold remediation is jokingly referred to as "spray and pray", and is not an effective way to deal with mold. (See page 15 to learn more.)

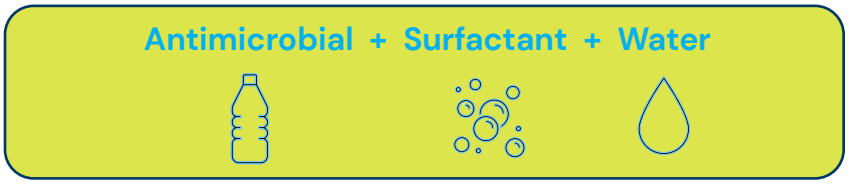
Other times, certain chemicals are used to upsell a customer or scare the customer into thinking that mold must be killed (as opposed to removed). Dead or dormant mold is still a health hazard and many of the components of a mold colony, such as mycotoxins and fungal fragments, are not living, so they can't be killed.

Trying to avoid using chemicals during remediation? Think again. Even water is a chemical! Remediation is ***not*** about avoiding ***all*** chemicals, but it is about avoiding *harsh* and *unnecessary* chemicals.

A SPECIAL NOTE: CHEMICALS & REMEDIATION

What chemicals are needed?

Harsh chemicals are rarely needed. Your remediation company can use an antimicrobial (i.e. isopropyl alcohol, hydrogen peroxide, or vinegar), and a surfactant (like dish soap) and water. This can be very effective when combined with abrasive measures and proper engineering controls and procedures. Note: Some antimicrobials already contain surfactants.



Are chemicals alone effective?

No. Simply spraying mold growth with a chemical is likely not enough, even if that chemical is marketed for its ability to "kill" mold. The EPA addresses the use of biocides in mold remediation by stating that: "Dead mold is allergenic and may cause allergic reactions and other health effects in some individuals, so it is not enough to simply kill the mold. It must also be removed."

Additionally, many products may remove the visible growth or bleach the color from the surface, but are unable to penetrate into the building material where mycelia (mold "roots") have grown. When favorable conditions return, mold can begin to regrow.

According to a 2013 study, Evaluation of Five Antifungal Agents Used in Remediation Practices Against Six Common Indoor Fungal Species, (see excerpt below) using *only* certain chemicals to address mold growth in materials like wood is not very effective. In order to salvage moldy materials such as wood, plaster, or concrete, mold growth above and below the surface must be physically stripped out of the material using an abrasive measure like wire brushing, HEPA sanding, or soda blasting.

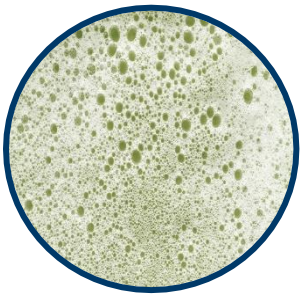
> *The inhibitory effect is reversible once the inhibitory substances are removed or become diluted; spores again become viable and mycelia can resume growth. Most of the fungicides are effective only on hard non-porous surfaces. Viable spores hiding in porous surfaces may be unaffected and can go dormant when fungicides are applied. The peak and valley terrain of porous substrates provide easy cover for micron size spores eluding direct contact with viscid antimicrobial agents. […] Our finding indicates that the commonly used fungicides in the indoor environment cannot completely kill all the fungal inocula. Most of the fungi form dormant spores when exposed with fungicides. These dormant spores can germinate and resume growth when a favorable environment is available to them. The results provide further evidence that physical removal of indoor fungal contaminated material is necessary as a proper remediation practice when dealing with indoor air quality problems. (Chakravarty, P & Kovar, Brad, 2013)*

Bottom line: No "spray and pray!" Strategic chemical use should always be *combined* with the appropriate abrasive measures and proper engineering controls and remediation procedures.

A SPECIAL NOTE: CHEMICALS & REMEDIATION

A case against bleach

Many government agencies are updating their recommendations to no longer recommend bleach as part of routine cleanup for mold. While bleach may be cheap and readily available, it has many drawbacks, including being corrosive to many building materials and potentially irritating to workers and building occupants. When it comes to mold, bleach is not very effective on porous and semi-porous materials like drywall or wood. For bleach to be most effective, it needs to be used on non-porous, clean materials like glass or tile. While bleach may remove staining, giving the appearance mold is gone, in reality the microflora may be left behind and under the right conditions mold may begin to regrow. (See pages 14-15 to learn more.)



Surfactants: Simple yet critical!

Surfactants play a critical role in the remediation process. Don't underestimate their importance. They reduce surface tension and help to trap and remove mold and other particles from surfaces. For example, common household dish soap has surfactants in it. It is the reason your dish soap is so effective at removing grease and food particles from your dishes. Using a product or solution with a surfactant in it can greatly improve the outcome of your remediation project.

What about fogging?

The purpose of fogging is to make the spores, fungal fragments, and other particles heavy enough that they fall to the nearest horizontal surface so they can be removed by HEPA vacuuming and/or wiping. If the particles are not removed quickly, they can become airborne again. Some fogging products claim to kill or denature particles so they are no longer a threat. However, the efficacy of these types of products varies greatly. Additionally, adding any chemical throughout a home, even all-natural ones, may cause health reactions in some individuals. The goal of any remediation project is always removal. For these reasons, fogging should never take the place of proper remediation of physical areas of growth. As with any chemical application, use caution and be careful of misleading marketing claims.

- ✓ Do not use chemicals as a *substitute* for proper mold removal! No "spray and pray"!
- ✓ Do not paint or encapsulate over mold. If encapsulates are used, they should be done *after* proper mold remediation and post-remediation verification (clearance testing).
- ✓ Always ask to see the product label for any product and insist on approval of any chemical applications ahead of time. Sensitive clients may request a sample of the product ahead of time to see if the product is tolerated.

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DON'T FALL FOR THESE MOLD MYTHS!

Myth #1: Mold that is dry, "dead," or dormant is no longer a health hazard.

A dry or dormant mold colony may not be growing, but it's still a health hazard. In fact, it's more likely to break into smaller fragments and become airborne. These fragments are more easily able to enter our lungs and bloodstream. Finally, many of the byproducts produced by a mold colony, like mycotoxins, mVOCs, and fungal fragments, are not living, so they can't be killed. Therefore, remediation should always focus on *removal*, not spraying, painting, fogging, or denaturing.

Myth #2: Mold behind a wall, under a floor, in an attic, in a crawlspace, etc., can't impact your home or your health.

Your home is not hermetically sealed. There are gaps and cracks along your walls, floors, and ceiling. Electrical outlets, recessed lights, gaps around plumbing, and other penetrations also allow for air movement from behind walls and under floors into the rest of your home. While these openings may seem small, they are big enough for mold spores, fungal fragments, and mycotoxins to enter and cross-contaminate your living spaces. Mold growth in your attic, basement, or crawlspace can enter your living space through these gaps. External forces like wind, HVAC systems, and stack effect further influence air movement between your walls and floors, potentially causing air from your basement or crawlspace to move up through your home and out your attic, or from your attic down into your home.

Myth #3: Only black mold is dangerous and needs proper remediation.

Color is not a reliable way to identify the species of mold. The same species of mold can be several different colors while different species of mold can be the same color. The only conclusive way to determine the type of mold is to test it. Similarly, it's not possible to simply look at mold growth and determine if mycotoxins are being produced. There are many components to a mold colony that can trigger health symptoms. That's why mold *growth*, active or dormant, regardless of species, should be safely removed.

Myth #4: The mold remediation company is the professional, so they must know what they are doing. There are laws in place to protect people.

In many areas mold remediation is like the wild west. It is *not* regulated by the federal government, nor is it regulated in most states. In most cases, remediation companies are not bound by any licensing, certification, or legal requirements. As a result, insufficient and unsafe remediation practices are common. Companies that rely on painting, fogging, or covering up mold *in place of* proper removal, or who remove mold and water damage without proper precautions, are putting the health, home, and finances of their client at risk. While the ANSI/IICRC S520 offers the only accredited mold remediation standards, these standards are optional for remediation companies to follow, and company certification doesn't necessarily mean compliance or implementation of these standards.

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FINAL THOUGHTS & ADDITIONAL RESOURCES

Should you remediate or move?

Making the decision to remediate a home or building can be complicated and dependent on many factors such as cost, desire, health, access to the right professionals, etc. In the cases of rental properties, HOAs, schools, and work, the decision may even be out of your control.

- ✖ It's not about being **pro**-remediation in every circumstance.
- ✖ It's not about being **anti**-remediation either.
- ✓ It is about make **informed** decisions based on your own unique circumstances–physical, financial, emotional, logistical, etc.

The first step in taking back control of your environment is understanding how your environment may be affecting your health and what you can do about it.

For step-by-step support navigating the inspection and remediation process, please visit our **"Start Here"** tab at **ChangeTheAirFoundation.org**

Free Downloads

"Steps to Inspecting and Remediating Your Home for Mold & Water Damage"

"The 5 Signs of Water Damage"; "Moisture Basics"

"Checklist: Where to Look for Mold & Water Damage"

"Questions to Ask When Hiring an IEP"

"A Guide to Testing Your Home for Mold & Water Damage"

"Mold Remediation at a Glance"

"Questions to Ask When Hiring a Remediation Company"

"Mold Remediation Contracts"

"A Guide to Testing Your Home for Mold & Water Damage"

"HVAC & Duct Cleaning Basics"

ChangeTheAirFoundation.org/free-downloads

Free Mini Class Series

Testing Options for Your Home

Mold Remediation Mini Class Series (Coming Fall 2024)

ChangeTheAirFoundation.org/mini-classes

TERMS TO KNOW

Air filtration device (AFD): A machine that filters and recirculates the air, sometimes known as an air scrubber. The AFD can be turned into a negative air machine (NAM) by venting the exhaust to the outside of containment. AFDs for mold remediation should utilize HEPA filters.

Air scrubber: See air filtration device.

Antimicrobials: Chemicals that reduce or control microbial growth.

Condition 1: An indoor environment with normal fungal ecology that may have the type and number of settled spores or fungal fragments that are to be expected within a similar indoor environment, and does not indicate a source of mold growth in the building.

Condition 2: An indoor environment with settled spores or fungal fragments that are a result of Condition 3; sometimes known as cross-contamination.

Condition 3: An indoor environment that is contaminated with actual mold growth, spores, and/or fungal fragments; growth can be active, dormant, visible, or hidden.

Containment: A critical barrier, often built around an impacted area, to keep contamination from escaping.

Cross-contamination: See Condition 2.

Decontamination chamber: One or more enclosures built to provide a transition space between the work area and surrounding living space for putting on and taking off PPE, wiping down bags of debris, etc. It is sometimes called a “decon” chamber.

Encapsulants: Chemicals that bind or cover contaminants.

Engineering controls: Strategies and measures used to reduce and prevent contamination from spreading outside a work area; can include containment, air scrubbers, negative air machines, etc.

Fungal fragments: Hyphae that have broken into smaller fragments and are susceptible to becoming airborne.

Fungicides: EPA registered disinfectants that kill fungus, yeast, and mold.

HEPA pizza: A 3-step process to remove particles involving HEPA vacuuming, damp wiping, and then dry wiping.

HEPA sandwich: A 3-step process to remove particles involving HEPA vacuuming, damp wiping, and then HEPA vacuuming.

Hyphae: Long branching filamentous cells from fungus on which mold spores can form, similar to a plant stem.

Manometer: A tool used to measure air pressure.

Mold spore: A reproductive structure of fungi, similar to how plants have seeds.

Mycelium: A mass of branching filaments from a mold colony that anchor to a surface, similar to a plant root.

Mycotoxin: A chemical released as a liquid-like substance and produced by mold under certain conditions and is poisonous to certain other living things.

Microbial volatile organic compounds (mVOCs): Chemicals released as a gas when organisms like mold and bacteria are actively feeding.

Negative air machine (NAM): An air filtration device that has been set up to create positive or negative pressure.

Personal protective equipment (PPE): Specialized clothing and equipment worn to protect from injury or illness.

Post-remediation verification (PRV): Sometimes known as post testing or clearance testing, it is an inspection done after remediation and usually involves a visual inspection, surface sampling, and air testing.

Small particle cleaning: A meticulous cleaning process designed to remove and reduce particles in an environment and on affected contents.

Surfactant: A substance that can reduce surface tension when dissolved in a liquid.

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