

Microbial Contamination and Control Conference



PDA[®]
Parenteral Drug Association
Midwest Chapter



Microbial Contamination and Control Conference

May 7th & 8th



Growth in the Workplace:

Assessment of Restoration Industry Standards for Complete Mold Remediation in the Pharmaceutical Cleanroom

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VALSOURCE

Innovative Solutions. Sustainable Results.



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Introduction



Amanda Curtis

BS in Microbiology from Purdue University

15 years experience between clinical and pharmaceutical micro

Focus on ATMPs and aseptic manufacturing



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Agenda

- Mold Remediation in the Pharmaceutical Industry
- Mold Remediation in the Cleaning and Restoration Industry
- Moving Forward with Mold Remediation
- References



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Mold Remediation in the Pharmaceutical Industry



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Scope

Small, Isolated Mold Recoveries

- One-off recoveries
- Low CFU recoveries
- No adverse trend



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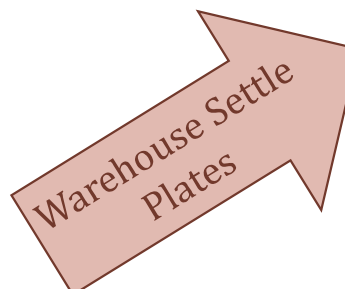
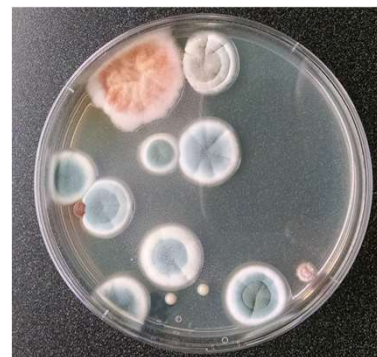
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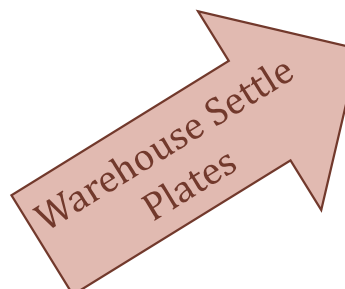
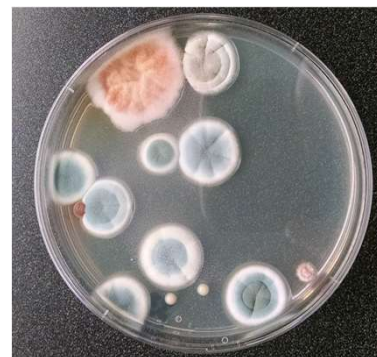


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Easy to remediate!
Area cleaning/disinfection
Procedural changes





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Large, Pervasive Mold Contamination

- Visible mold
- High CFU recoveries
- Adverse trends
- Don't respond to standard remediation efforts



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Large, Pervasive Mold Contamination

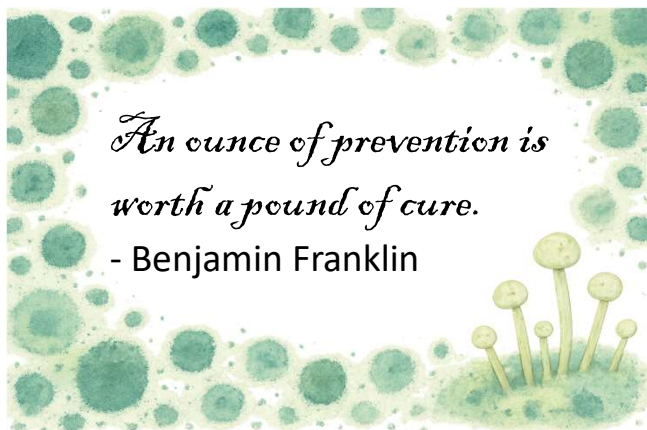
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- High CFU recoveries
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- Don't respond to standard remediation efforts





Mold Investigation and Remediation Guidance

“The most common cause of fungal spore...contamination in the cleanrooms are items that enter the cleanroom.” Examples include tools, equipment, boxes, carts, etc.¹



SO MUCH GUIDANCE on:

- Sources of mold and environmental control to prevent mold^{2,3,4,9}
- Monitoring of mold^{2,8,10}
- Investigation of mold events^{1,3,4}
- Cleaning and disinfection programs that are effective against mold^{3,4,9}



Case Study 1: Large, Isolated Contamination

Background: Warehouse employees identified visible mold on cardboard boxes, wire shelves, and wall material in the warehouse.

Root Cause: Not investigated. Assumed to be due to high humidity due to geographical location.

Remediation: Opened the warehouse roll-up doors to the outside for ventilation and used a sporicidal agent on all impacted surfaces. Discarded impacted cardboard.





Case Study 2: Large, Pervasive Contamination

Background: Firm had mold in one of their Grade B cleanrooms coming from the humidified incubators. CAPAs included enhancing the PM procedures for the incubators and using an antimicrobial agent in the water pans.

By this time, however, the incubators were contaminated throughout and were continuing to exhaust spores into the cleanroom. New incubators were sourced, purchased, validated, and implemented.

Now though, mold is still being recovered from the original cleanroom and a cleanroom on the same AHU.





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Case Study 2: Large, Pervasive Contamination

Root Cause: Assumed that mold originated in the incubators and had found subsequent reservoirs within the cleanroom.

Remediation: Company brought in a third party to fog the impacted cleanrooms with vaporized hydrogen peroxide (VHP). Cleanrooms were fogged at least 4 times in a 1-month timespan, with continuing mold recoveries from air EM samples.

Takeaway Lesson: Mold remediation must occur quickly. The source of the mold, as well as the water and nutrient source it's using, must be identified in order to remediate it.





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What's Wrong Here?

Incomplete remediation can lead to:

- Recurrence
- EM excursions, adverse trend investigations, deviations
 - Delayed batch release
- Ineffective CAPAs, leading to wasted time/effort/money
- Contaminated product





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WXYZ Channel 7

Ex-NECC owner pleads no contest to manslaughter charges in Michigan connected to 2012 meningitis outbreak

Barry Cadden, the former owner of New England Compounding Center (NECC), pled no contest to in connection to the 2012 fungal meningitis...

Mar 5, 2024



Law360

Ex-Pharmacist Faces Rare Murder Trial In Meningitis Outbreak

al legal question is set to be decided

Massachusetts Lawyers Weekly

NECC founder gets 10-year prison term for 11 deaths from tainted steroids in Michigan

A Michigan judge sentenced former New England Compounding Center founder and president Barry Cadden to at least 10 years in prison on May 10...

May 14, 2024





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Mold Remediation in the Restoration Industry



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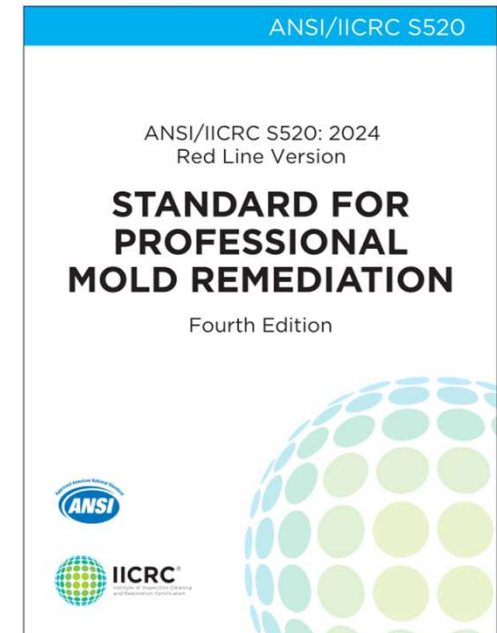
Mold Remediation in the Restoration Industry

IICRC (Institute of Inspection Cleaning and Restoration Certification): Global organization that provides industry standards, credentials, and certifications

- Each state will have its own set of standards and license requirements.

Illinois amends Mold Remediation Registration Act to include IICRC certifications; Gov. Pritzker signs SB 1087 into law following unanimous legislative approval

Aug 15, 2024 • Press Release • 2 min read





Major Themes of Mold Remediation⁵

Primary mold remediation technique: Physical removal of contaminated items.

- Disinfection/fogging/etc with antimicrobial chemicals is **not** to be used in place of physical removal.

1.4 Contamination Removal

Physically removing mold contamination is the primary means of remediation. Mold contamination *should* be physically removed from the structure, systems, and contents.

Attempts to kill, encapsulate, or inhibit mold instead of proper source removal generally are not adequate. The Standard emphasizes source removal by physical methods, therefore utilizing spray, fog, foam, gas, or other remediation approaches, without physical removal, is a deviation from this standard of care. Refer to Sections 2.1.2 *Cleaner, Stain-Remover and Antimicrobial Application Considerations* and 9.3.9 *Deviation from Removal Processes* for additional information.

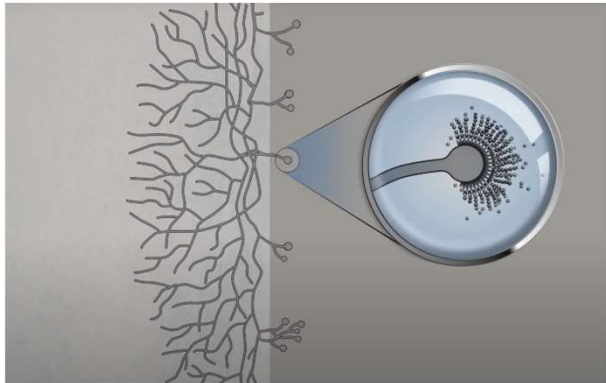
Why?



Major Themes of Mold Remediation

1. Only removes surface structures, not the hyphae (“roots”)⁵

Inside material Visible surface



2. Some molds are hydrophobic and repel water-based disinfectant droplets⁶



3. Nonviable spores can still cause health effects⁷





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Major Themes of Mold Remediation⁵

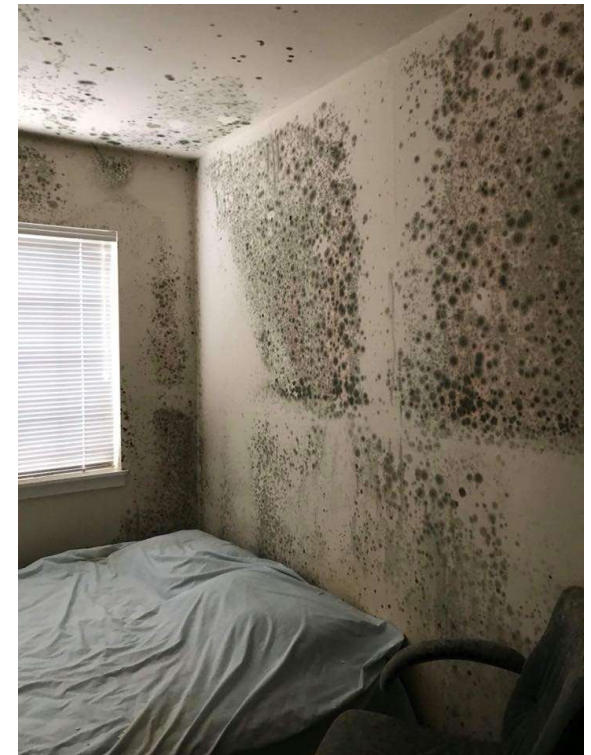
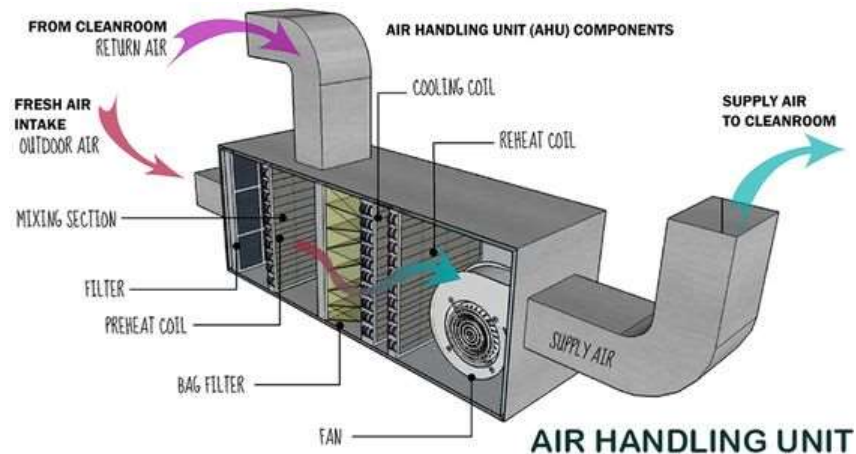
Locate the mold, nutrient, and water source(s) and remediate them.





Major Themes of Mold Remediation⁵

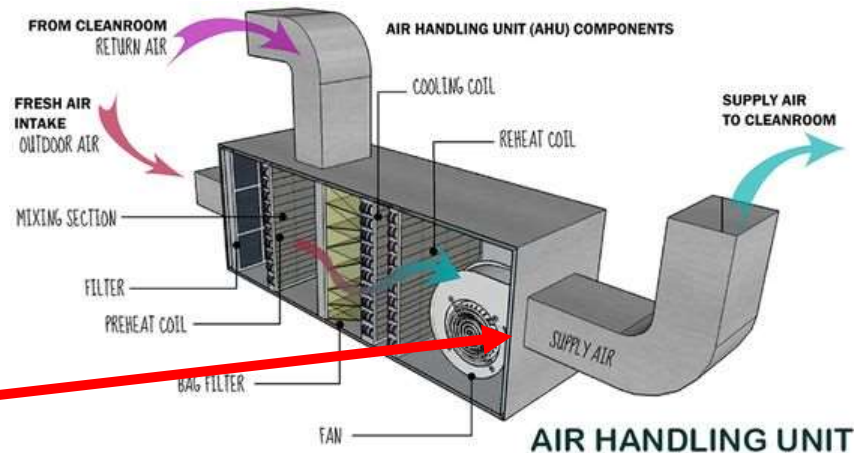
Ensure current HVAC system is able to maintain appropriate temperatures and relative humidities





Major Themes of Mold Remediation⁵

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Major Themes of Mold Remediation⁵



Containment with HEPA filtration under negative pressure is critical during remediation activities.

Containment \neq painting over mold with mold-resistant or encapsulating paint.





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Moving Forward With Mold Remediation



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Source of mold (including nutrients and water source) to be investigated before it can be remediated



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1. Personnel involved aren't trained or qualified, and do not have sufficient PPE to protect themselves or prevent spread throughout facility
2. Impacted surfaces not physically removed = mold left in the space
3. Nonviable spores can still cause health problems (mycotoxins, allergens)
4. (Assumed) high humidity not addressed



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Case Study 2: Large, Pervasive Contamination

Summary: Company had mold that originated in their humidified incubators. Over several years they investigated, implemented CAPAs, and eventually replaced the incubators. Now there is still mold in their air, and it is unknown where it's coming from. Room has been fogged with VHP an exorbitant number of times.





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Summary: Company had mold that originated in their humidified incubators. Over several years they investigated, implemented CAPAs, and eventually replaced the incubators. Now there is still mold in their air, and it is unknown where it's coming from. Room has been fogged with VHP an exorbitant number of times.

1. Contain the room. Stop using it. Stop VHP fogging it.
2. Take investigational EM samples in strategic locations.
3. Take atmospheric readings (rH, temperature). Is the system functioning?
4. Look for moisture sources.
5. Look for biofilms.



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Conclusion

- The pharmaceutical industry is good at dealing with small, isolated mold recoveries.
- We can learn from the cleaning and restoration industry
 - Physical removal of contaminated materials must be primary
 - Mold, nutrient, and water sources must be identified and remediated
 - Current HVAC system must be evaluated
 - Impacted area must be appropriately contained



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6. Bayry J, Aimaganianda V, Guijarro JI, Sunde M, Latgé JP. "Hydrophobins--unique fungal proteins." PLoS Pathog. 2012;8(5).
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9. United States Pharmacopoeia. "<1072>: Disinfectants and Antiseptics."
10. United States Pharmacopoeia. "<1116>: Microbiological Control and Monitoring of Aseptic Processing Environments."



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Thank you!

Any questions?