



EnviroScope

ENVIRONMENTAL WHITE PAPER FOR ALLIED WORLD POLICYHOLDERS

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MOLD CASE STUDIES AND PREVENTATIVE BEST PRACTICES

Whether you are a commercial property owner, real estate manager or construction contractor, exposure to claims and losses associated with exposure to indoor mold contamination is becoming increasingly more frequent and often times can be attributed to unique environmental conditions, attributes in the building envelope or HVAC design. The consequences of these mold claims usually result in significant financial loss for the cleanup and restoration work, in lawsuits where tenants alleged bodily injury (BI) or property damage (PD), and in lost revenue resulting from business interruption. By analyzing examples of previous mold claims, there have been a number of proactive measures and recommended best practices identified that companies facing this risk can undertake to mitigate or eliminate their exposure to losses resulting from potential or actual mold claims.

This white paper provides examples of several recent, noteworthy mold contamination cases to show the proximal root causes that contributed in whole or part to the mold contamination. In addition, the paper provides proactive measures companies can and should undertake as part of their property management, inspection and maintenance programs to ensure these causes do not exist.

WHAT IS THE RISK?

Mold is ubiquitous in the environment we live in. Indoor mold contamination frequently occurs where a source of moisture is introduced in the building envelope and comes in contact with common building materials which then serve as the nutrient substrate for mold growth. As long as the moisture intrusion and favorable growth conditions persist, mold growth will continue to propagate and spread along the surface of building materials, such as sheetrock, plywood, wood framing, wallpaper and HVAC system ductwork. According to the CDC¹, the following conditions are needed to promote mold growth:

- 1) Temperature range above 40°F and below 100°F
- 2) Mold spores
- 3) Nutrient base (most surfaces contain nutrients) – organic substances
- 4) Moisture

Among these, the presence of moisture represents the most controllable condition and an effective mold management plan should include provisions for eliminating moisture/water intrusion as the principal means for preventing mold growth. Water and moisture are commonly introduced through plumbing fixtures, through gaps or openings in the exterior building shell, and through defective roofing materials. Moisture will also enter a building as water vapor by diffusion of outdoor air through openings in the building shell or intentionally introduced through the HVAC system. An effective water intrusion plan should include provisions for promptly addressing all leaks immediately upon discovery, and where necessary, monitoring and managing relative humidity through installation of dehumidification systems, separately or in conjunction with the operation of the building heating and cooling systems. While temperature is controllable, the demands for a comfortable living environment impose certain limitations on exclusively relying on temperature management as the primary means of preventing mold growth. Because the temperature levels most people consider comfortable also correspond to the temperature needed for optimal mold growth, the relationship between relative humidity and temperature becomes a critical factor, particularly in areas prone to high levels of natural humidity such as the Atlantic and Gulf States. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) publishes guidance documents, industry papers and articles outlining the recommended methods for controlling building moisture and humidification levels to minimize potential exposure to indoor mold growth.²

Different state and federal regulatory agencies offer guidelines regarding the recommended steps to eliminate and abate the presence of indoor mold contamination. Where state specific jurisdictional guidelines do not exist, most water intrusion and mold management plans usually incorporate the recommended best practices presented in these existing guidelines. There is no one-size-fits-all approach, and the specific conditions and attributes of each building should be taken into consideration when developing a water intrusion and mold management plan to achieve the most effective results.

MOLD CASE STUDIES

The presence of mold contamination has been documented in the following case studies that depict various occupational settings to demonstrate how mold contamination can exist in building regardless of their different occupancy uses. The selected examples include the presence of mold contamination that has been reported in both multifamily and hospitality building uses. In addition to building occupants, the Occupational Safety Health Administration (OSHA) also requires employers provide employees with a place of employment that is free from recognized hazards that could cause physical harm. The impacts of a significant mold contamination event not only result in building stigma, but could also affect the health and safety of employees who direct and maintain the building operations.

Case Study #1

Mold was identified throughout every room of a hotel located in the northeast United States. The source of the mold was attributed to a tropical storm that provided the water/moisture that intruded through leaking windows and holes in the exterior of the building envelope. Additionally, the HVAC system was an older design that did not have the ability to regulate the indoor building humidity, and therefore, caused water vapor to form that coated the interior building surfaces. The water vapor/moisture was able to penetrate wallpaper that created a good environment to allow the mold growth to amplify further. The water damage soaked some walls that also allowed for the growth of mold on the inside of the sheet rock, which impacted the insulation of the building.

A large-scale cleanup was conducted, which required portions of the hotel to be shut down causing business interruption losses. Impacted building materials were either cleaned or removed; typically porous material needed to be removed while solid structures could be cleaned. The total cost for the cleanup and the restoration approached one million dollars. Additionally, the HVAC system was antiquated and a new HVAC system would be needed to regulate the humidity so that a reoccurrence of mold growth during future storm events would not occur.

A review of the hotel maintenance procedures identified that there was no awareness plan or general awareness training for the employees. To assist hotel management in the prevention of potential reoccurring future mold events, the hotel owner was provided with an awareness plan and checklist, which included identifying areas of the building that permitted water intrusion and required repair and maintenance to prevent a repeat event. Since implementing the checklist, there hasn't been a recurring mold event demonstrating that the water intrusion repairs and implementation of the mold awareness plan were effective in controlling this risk.

Case Study #2

Mold was identified throughout a partially constructed multi-family apartment building located in an Atlantic coastal US state. The sources of the mold were attributed to a rain event that provided the water/moisture, which inundated the interior building surfaces (e.g., wood beams, insulation, sheet rock, and concrete floors). Additionally, all building materials that were uncovered and wet from the rain event also had been allowed to remain saturated, which eventually contributed to the mold growth. Based on the conditions noted above, the mold propagated throughout the entire uncompleted four-story building within about one week's time before it was finally discovered.

A large-scale cleanup was conducted, which required that the construction work stop until the cleanup was completed, and the ensuing business interruption lasted two months. The impacted building materials (noted above) had to be either cleaned or removed and the final loss cost between the cleanup, restoration, and business interruption approached half a million dollars.

The construction contractor was immediately provided with a water intrusion and mold management recommendation to weatherproof all building materials during a rain event until the building envelope was completed sealed in. Following implementation of the mold management recommendation, the building was completed with no recurring mold events.

Case Study #3

Mold was identified throughout every room of a recently constructed hotel located in a major US metropolitan area. There were three casual/contributing factors associated with the identified mold impact: 1) The HVAC system was not properly regulating humidity that subsequently impacted the vents, walls and structures within the guest rooms; 2) improper construction of the shower doors allowed water to escape the shower pans, travel beneath the doors and impact the floors and walls of the guest rooms; and 3) ongoing water intrusion resulting from construction work and contractor's slow response to repair the roof openings impacted the top floor and seeped through various building openings eventually leading to the basement where mold growth occurred on the walls and floors.

A large-scale cleanup was conducted, which required that portions of the hotel be shut down incurring business interruption losses. The impacted building materials were either cleaned or removed, and the roof openings were repaired. The HVAC system was rebalanced to reduce and control the high humidity

levels and the shower doors were fixed to prevent water intrusion and leak migration. The total cost between the cleanup and restoration approached one million dollars.

In this example, several weeks after the HVAC system repair and the remediation/restoration was complete, the HVAC system was unable to be rebalanced effectively and the remediated and restored rooms had a recurrence of mold growth that impacted many of the guest rooms at the hotel. The HVAC system continued to have mechanical difficulties in balancing the humidity level in the building and continued to operate poorly. Shortly after the second remedial and restoration event, mold began to reappear in many rooms triggering a third remediation, restoration, and business interruption event.

A review of the hotel maintenance procedures identified that there was no mold awareness plan or general awareness training for the employees and contractors. The hotel owner was provided with an awareness plan and checklist they could implement to prevent a repeat mold event. Since implementing the recommended checklist items, there have not been any recurring new mold events reported.

RECOMMENDED BEST PRACTICES

The key to the success of best practices for the prevention of mold is implementing actions that start with **awareness** of the potential for mold. Presented below are key risk management practices and procedures that are easy and quick to perform and can prevent or reduce the potential for mold growth.

- Training/Education – A water intrusion and mold management plan should be developed that outlines how all employees should be trained to know what mold looks like and the less obvious signs of mold contamination (i.e., odor). A quicker identification of mold allows for a quicker response that reduces the extent and overall cleanup cost. By having all staff of a business involved, the risk for a catastrophic mold event is significantly reduced.
- Communication – This practice technique is vital from the training, to the identification of possible mold, to informing management that there may be an issue that needs immediate attention. Consider having a bilingual water intrusion and mold management plan, where necessary, to reach workers or contractors whose native language is not English or for those workers who maintain properties in different countries.
- Inspections – Periodic inspections should be performed as part of the normal business and building maintenance responsibilities. The inspections should focus on areas that are most prone to moisture, particularly areas where there is water and/or moisture present (e.g., bathrooms, kitchens, laundry rooms) or those that are created by building HVAC equipment.
- Reporting – Documenting the inspection findings, the results of any repairs, and any remedial actions is important so that mold issues could be tracked in the future, to understand prior issues as they relate to new issues, and for transactional due diligence reasons.
- Retain Qualified Contractors – When a mold condition is identified and your business is not equipped to handle the issue internally, you should have several water restoration and mold contractors on call. These contractors should be interviewed and determined to be qualified experts.

- Audits – Management should perform periodic audits of the recommended best practices to verify that they are working at a level to prevent or reduce the potential for mold. These audits will allow for the identification of best management practice issues that could be implemented quickly at any other owned or insured locations.

The documents below provided by Roux Associates, Inc. outline the key mold/water intrusion awareness, inspection and maintenance activities that are recommended to be conducted to identify and respond appropriately to potential mold and water intrusion within key hospitality and habitation facility structures.

Resources

¹"Moisture, Mold and Mildew." (n.d.): n. pag. *Centers for Disease Control and Prevention*. Web. <<http://www.cdc.gov/niosh/pdfs/appenc.pdf>>.

²"ASHRAE Bookstore In Partnership with TECHSTREETBookstore In Partnership with TECHSTREET." *Humidity Control: Applications, Control Levels, and Mold Avoidance*. N.p., 2015. Web. 09 Mar. 2016. <<http://www.techstreet.com/ashrae/products/1903742>>.

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Mold/Water Intrusion Awareness, Inspection and Maintenance Activities for the Hospitality Industry

Preventative measures implemented to reduce or eliminate water intrusion and mold growth can decrease the potential for business interruption during the remediation and restoration of such impacts. Provided below are the key mold/water intrusion awareness, inspection, and maintenance activities that are recommended to be conducted to identify and respond appropriately to potential mold and water intrusion within key hospitality facilities e.g., Hotels, Motels, Bed & Breakfasts, or Inns. Each activity has a recommended time frame (schedule) for its implementation.

Mold/Water Intrusion Inspection and Maintenance Activities

Activity	Schedule
Implementation of Water Intrusion/Mold Management Plan¹	
a. Implementation of Preventive Maintenance Program	Continuous
b. Perform Auditing/Monitoring Documentation	Quarterly
c. Retain Qualified Mold/Water Intrusion Contractors ²	As needed
General Inspections	
a. Interior of Building/Structure	
i. All rooms and structures inspected for mold/water intrusion (Walls ³ , Ceiling ⁴ , Windows, Carpet, Furniture, Bathroom ⁵) regardless of USE	Continuous – as part of all personnel operations
ii. HVAC System including Ducts	Seasonal
iii. Restaurant Venting Duct System	Continuous
iv. Boiler System	Quarterly
v. Fire Suppression/Sprinkler System	Continuous
vi. Cooling Tower	Seasonal
vii. Skylights	Continuous
viii. Pool/Spa	Continuous
ix. Laundry Facilities	Continuous
x. General Plumbing Structures	Continuous
b. Exterior of Building/Structure	
i. Walls	Semi-Annually
ii. Roof	Semi-Annually
iii. Balconies/Terraces	Semi - Annually
iv. Cladding	Semi-Annually
v. Downspouts/Drains	Quarterly
vi. Ponding/Flooding	Continuous
vii. Irrigation System	Seasonal
General Construction/Restoration	
Any new construction/restoration activities should be designed to address	During and After

the potential for water intrusion and mold growth.	Construction is complete
Personnel	
All personnel/workers should always be observant of mold and water intrusion during their everyday operations. Any potentially identified water intrusion or mold growth must be immediately reported up the chain of management command. The faster the reporting, the faster the potential issues are addressed to reduce/prevent business interruption.	
a. Auditing/Monitoring by Management ⁶	Quarterly*
Reporting/Communications	
a. Inspection Reports	Monthly*
b. Communications (All Personnel)	Continuous
Awareness Training/Education⁷	
a. Management	Quarterly
b. Workers	Semi-Annually

Continuous Schedule – All personnel during the daily operations should be continuously observant of these issues.

Actions to be Taken Immediately after a Storm Event or Significant Power Failure

The following noted activities should be implemented immediately and no less than 5 days after such event regardless of when they were last conducted, while a significant power failure would be a loss of power for at least 24 hours.

- General Inspections; and
- Reporting/Communications.

*Activity must be performed immediately after any observant issue.

¹ Water Intrusion and Mold Management Plan - It is a best practice to have a Water Intrusion/Mold Management Plan prepared to provide the necessary guidance to become aware, prevent, and respond/remediate to water intrusion and mold growth. This Plan is a simple and cost effective tool that can be utilized by all workers of the facility. The Plan provides organization within the company, where specific management personnel are assigned to receive communications from the staff so that responses to water intrusion and mold growth can be addressed immediately.

² Qualified Water Intrusion or Mold Remediation Contractors can be obtained through internet searches or from Allied World Assurance Company.

³ During all mold and water intrusion inspections, special attention should be given to all walls that are covered with wall paper, especially vinyl wall paper.

⁴ If a drop ceiling is present, then an inspection for water intrusion and mold must be performed above the drop ceiling. Inspection schedule is recommended quarterly.

⁵ Inspections of bathroom exhaust ventilation should be included on a seasonal basis.

⁶ Management Auditing and Monitoring is a key loss control activity, and if it can become incorporated into the culture of the firm, allows for the reduction of expenditures and losses from potential water intrusion and mold growth.

⁷ Awareness Training/Education is a must for success at reducing/preventing significant downtime to address water intrusion and mold growth. There are many vendors that provide such training, and a list of those qualified trainers can be obtained through internet searches or from Allied World Assurance Company.

Mold/Water Intrusion Awareness, Inspection and Maintenance Activities for Habitation Facilities

Preventative measures implemented to reduce or eliminate water intrusion and mold growth can decrease the potential for business interruption during the remediation and restoration of such impacts. Provided below are the key mold/water intrusion awareness, inspection, and maintenance activities that are recommended to be conducted to identify and respond appropriately to potential mold and water intrusion within key habitation facilities e.g., Apartment Complexes, Townhouses/Condos, Office Buildings/Commercial Structures (2 to 3-story buildings). Each activity has a recommended time frame (schedule) for its implementation.

Mold/Water Intrusion Inspection and Maintenance Activities

Activity	Schedule
Implementation of Water Intrusion/Mold Management Plan¹	
d. Implementation of Preventive Maintenance Program	Continuous
e. Perform Auditing/Monitoring Documentation	Quarterly
f. Retain Qualified Mold/Water Intrusion Contractors ²	As needed
General Inspections	
c. Interior of Building/Structure	
i. All rooms and structures inspected for mold/water intrusion (Walls ³ , Ceiling ⁴ , Windows, Carpet, Furniture, Bathroom ⁵) regardless of USE	Continuous – as part of all personnel operations
ii. HVAC System including Ducts	Seasonal
iii. Boiler System	Quarterly
iv. Cooling Tower	Seasonal
v. Skylights	Continuous
vi. Pool/Spa**	Continuous
vii. General Plumbing Structures	Continuous
d. Exterior of Building/Structure	
i. Walls	Semi-Annually
ii. Roof	Semi-Annually
iii. Balconies/Terraces	Semi - Annually
iv. Cladding	Semi-Annually
v. Downspouts/Drains	Quarterly
vi. Ponding/Flooding	Continuous
vii. Irrigation System	Seasonal
General Construction/Restoration	
Any new construction/restoration activities should be designed to address the potential for water intrusion and mold growth.	During and After Construction is complete

Personnel	
All personnel/workers should always be observant of mold and water intrusion during their everyday operations. Any potentially identified water intrusion or mold growth must be immediately reported up the chain of management command. The faster the reporting, the faster the potential issues are addressed to reduce/prevent business interruption.	
b. Auditing/Monitoring by Management ⁶	Quarterly*
Reporting/Communications	
c. Inspection Reports	Monthly*
d. Communications (All Personnel)	Continuous
Awareness Training/Education⁷	
c. Management	Quarterly
d. Workers	Semi-Annually

Continuous Schedule – All personnel during the daily operations should be continuously observant of these issues.

Actions to be Taken Immediately after a Storm Event or Significant Power Failure

The following noted activities should be implemented immediately and no less than 5 days after such event regardless of when they were last conducted. A storm event includes any condition that provides significant wet weather or high humidity, while a significant power failure would be a loss of power for at least 24 hours.

- General Inspections
- Reporting/Communications

*Activity must be performed immediately after any observant issue.

**Inspection of an interior pool and spa are likely to be present at the apartment complex or townhouse/condo.

1 Water Intrusion and Mold Management Plan – It is a best practice to have a Water Intrusion/Mold Management Plan prepared to provide the necessary guidance to become aware, prevent, and respond/remediate to water intrusion and mold growth. This Plan is a simple and cost effective tool that can be utilized by all workers of the facility. The Plan provides organization within the company, where specific management personnel are assigned to receive communications from the staff so that responses to water intrusion and mold growth can be addressed immediately.

2 Qualified Water Intrusion or Mold Remediation Contractors can be obtained through internet searches or from Allied World Assurance Company.

3 During all mold and water intrusion inspections, special attention should be given to all walls with wall paper, especially vinyl wall paper.

4 If a drop ceiling is present, then an inspection for water intrusion and mold must be performed above the drop ceiling. Inspection schedule is recommended quarterly.

5 Inspections of bathrooms exhaust ventilation system should be included on a seasonal basis.

6 Management Auditing and Monitoring is a key loss control activity, and if it can become incorporated into the culture of the firm, allows for the reduction of expenditures and losses from potential water intrusion and mold growth.

7 Awareness Training/Education is a must for success at reducing/preventing significant downtime to address water intrusion and mold growth. There are many vendors that provide such training, and a list of those qualified trainers can be obtained through internet searches or from Allied World Assurance Company.