Moisture and Mold in a Tenant Improvement

The Problem

During tenant improvement renovations at a commercial office building located in Buffalo Grove, Illinois, the general contractor discovered mold growth in several locations in the building. The tenant contacted Chelsea Group to conduct a visual observation of the facility with special consideration to areas with reported biological growth, perimeter spaces, and the exterior building envelope.

The facility is a 62,000 square foot, two-story facility functioning as both laboratory and office space. Many of the office areas in the building were wallpapered, and the tenant wanted to limit the amount of destructive testing. The Chelsea team used infrared thermography to limit the damage to building materials.

The purpose of the assessment was to observe the conditions at the property and determine the extent of biologically impacted building materials and the potential sources of water intrusion. In addition to visual observations, a sampling protocol was conducted to determine whether the indoor air quality and HVAC systems had been affected by the mold growth. Finally, based on the findings, Chelsea Group provided recommendations regarding proper cleaning and removal techniques and further investigation where necessary.

Chelsea Group Intervention

Interior Inspection

Chelsea Group conducted a visual observation of the interior space of the building that was documented with digital photographs. In addition, infrared photographs were taken to determine the surface temperatures of exterior walls and columns, which can often indicate moisture intrusion.

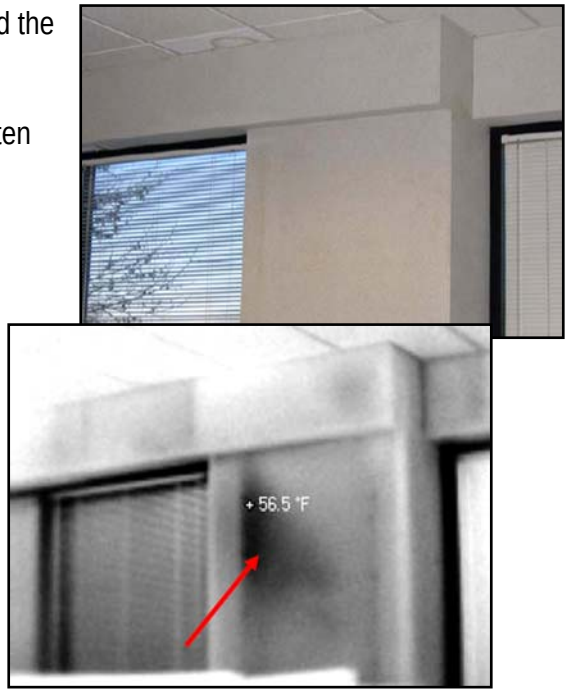
In this initial inspection, suspected biological growth was observed along the base drywall of areas under renovation, in addition to some water stained ceiling tiles. Chelsea Group recommended that window caulking and flashing be inspected from the exterior to rule out potential pathways of water intrusion.

Immediate results: The majority of biological growth was contained to the areas where renovation was taking place, which were already under containment to reduce construction debris, putting the tenants at ease.

Using a moisture meter, a moisture survey of the porous and semi-porous building materials of the facility was conducted where water staining was observed and at random exterior locations. Temperature, relative humidity, and dew point measurements were also taken. The presence of moisture does not necessarily indicate mold growth, but does indicate the potential for it.

> Immediate results: Some slight indications of potential moisture were noted in exterior building materials; however, for the most part no elevated moisture levels were registered. Further investigative techniques were necessary.

Many of the office areas in the building were wallpapered, and the tenant wanted to limit the amount of destructive testing. The Chelsea team used infrared thermography to determine the surface temperatures of exterior walls and columns, which often indicate moisture intrusion. This was especially helpful on wallcovered exterior walls, and also in areas that were inaccessible due to furniture storage.



In some areas along base drywall, suspected biological growth was observed. Although elevated moisture levels did not register on the moisture meter, thermal differences were observed in the infrared thermograph.

> Immediate results: Infrared thermographs identified potential moisture in several areas where no mold growth was visually observed or registered by moisture meters.

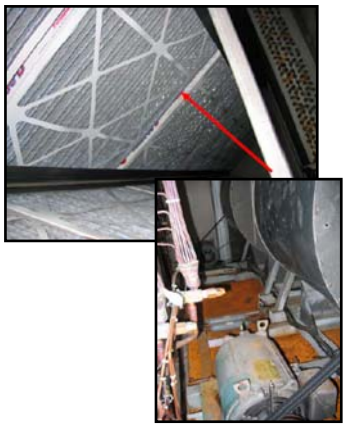
Sampling Protocol

Based on the initial site assessment of the facility conducted by the Chelsea team, a biological sampling strategy was developed to evaluate whether and to what extent any type of microbial (fungal) amplification from the HVAC system was dispersed through the building. The interiors of all of the air handlers were visually inspected for potential microbial growth.

Surface tape-lift samples were collected in the air handling systems to distinguish between settled mold spores, normal in a typical environment, versus amplification. The samples were collected on the downstream side of the cooling coil and on the fiberglass insulation of the fan cabinets.

Airborne spore-trap samples were also collected to determine the source amplification effect on the indoor air quality. The air samples helped to deduce if spores from surface growth were being distributed to non-impacted areas through the air distribution system because of the open-plenum nature of the ventilation system. All of the samples were processed by an AIHA accredited environmental microbiology laboratory.

No overt biological growth was observed in the air handling systems. All other areas in which airborne samples were collected did not indicate the spread of the discovered indoor amplification to other non-renovation areas at the time of the sampling. The concentrations and types of spores from the indoor samples were comparable to outdoor baselines and to non-impacted interior controls.



Immediate results: Although no overt biological growth was found in the air handling systems, during the sampling protocol Chelsea Group found some other mechanical concerns:

- Gaps existed between individual filters, and the end caps of the filter racks were missing, allowing particulate build-up on cooling coils, which can lead to increased energy usage.
- The cooling coils and condensate pans were dry at the time, but rusting of the condensate pans was noted. Standing water during the cooling season has the potential to support biological growth.

Exterior Inspection

The Chelsea team carried out an exterior building envelope inspection, with attention to the waterproofing systems of windows and structural columns. A brief walk-around of the building's perimeter was conducted to observe any conditions that may be conducive to water intrusion.

At the time of the site-assessment, water was observed streaming off the roof in sections where sloped roof lines meet. Snow and ice build-up was observed where the two roof lines meet. The building exterior at these areas was water stained, and water was observed pooling near the foundation in some of these areas. In addition, a small gutter system with a heater was observed in two locations to combat the ice damming issues that were reported by the Lead Engineer. Again, water was observed flowing over these drainage systems, down the side of the building.

Landscaping around the building perimeter was sloped towards the building in several locations. In addition, there were areas where the landscaping covered the bottom window flashing and weep holes. These conditions can lead to water intrusion through the building envelope. Some landscaping sprinkler heads were closely positioned to the building exterior, which may be an additional source of water during the spring and summer months.

Waterproofing systems, specifically exterior caulking of the second floor, were not easily accessible. The property managers indicated that plans to re-caulk the building exterior were part of that year's capital planning budget.

Immediate results: Chelsea Group recommended:

- Investigate options for proper roof watershed systems to direct rain and melting snow off the roof away from the foundation of the building.
- Re-landscape areas that currently slope towards the foundation of the building to reduce potential of water intrusion.
- Re-locate landscaping sprinklers that spray water on the building.

Final Results

Following Chelsea Group's careful planning, the discovered moisture and limited biological growth did not significantly slow the renovation schedule:

- Customized moisture mapping and infrared thermography identified the interior affected areas.
- The integration of building sciences helped identify potential water infiltration points and solutions for proper management of watershed from the roof and landscaping systems.
- A thorough plan effectively guided remediation work.
- Bioaerosol sampling provided verification of proper handling of mold removal and no further active mold growth.
- The tenants were assured of an acceptable indoor environment for the building occupants.