

Occupant Health and its Inter-relationship with Building Science

By Allan E. Burt, MBA

The emergency nature of an owner's response to occupant complaints attributed to Indoor Environmental and Air Quality (IEAQ) conditions, results in the selection of environmental professionals, remediators or trade contractors. The desired outcome is to remedy any contributing building conditions and focus on the occupants' concerns. However, none of these professionals are likely to have any relevant medical expertise to directly investigate or address occupant health concerns, and this well-intended response may lead to occupant health inferences and unfounded conclusions. A lack of medical expertise can result in a costly outcome for the building owner or remediation contractor in managing each stage of a major incident. Although the perception may be that the health-related issues began with the incident, the reality and origin may lay elsewhere.

Building Science Decisions Can Affect Occupant Health

Building development involves three aspects—design, build and maintain. Design professionals provide code-compliant construction documents of a building for a defined use and occupancy. Contractors build to the design, and occupants arrive. The owner operates and maintains the building.

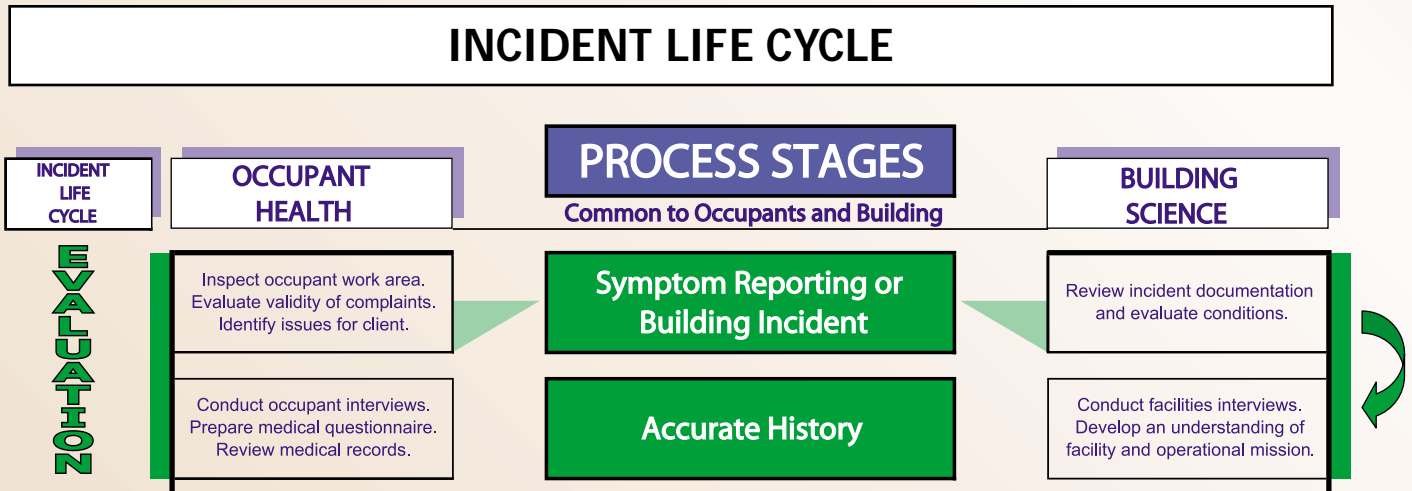
Design inadequacies may surface as errors and omissions; build problems may reveal themselves as construction defects; and maintenance problems may arise as occupants' health concerns are converted to complaints after occupancy brings the building to life. Occupant health does not directly receive significant consideration during the first two stages; however, the groundwork for a healthy building is found in both of these.

The Association of General Contractors (AGC) has published mold guidance for professionals and contractors.¹ The AGC recognizes that early consideration of contributing factors can mitigate future occurrences which could lead to claims or litigation. Some examples of primary prevention awareness at these stages are:

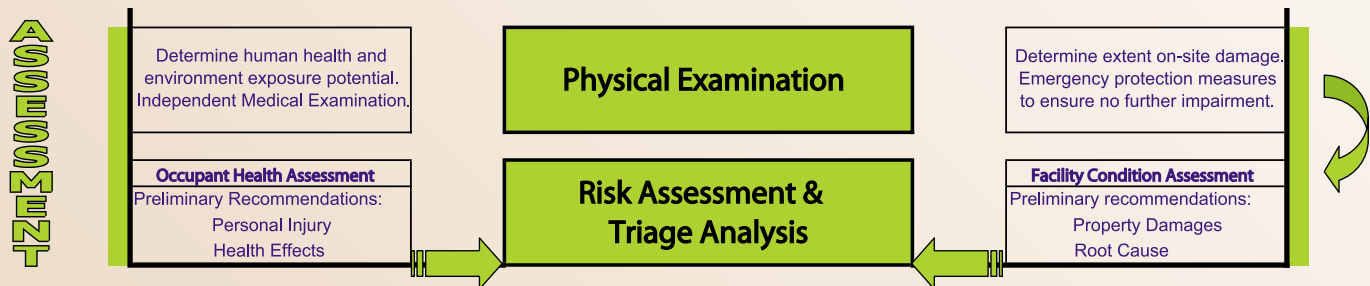
- Accessibility – coordination of duct access door size and placement during design to allow routine inspections of the interior condition of the ductwork and vertical shafts.
- Material Selection – specifications requiring non-porous, cleanable duct liner as well as other mold resistant building materials.
- Construction Materials Handling – incorporation of material protection requirements and awareness in the general specifications for all trades, similar to construction safety policy. Sheet rock must be protected and kept dry. The lined duct sections must be sealed at the fabrication facility with plastic for protection during transport, site storage and, during installation, the open end should be sealed until installation is complete.
- On-site Storage – require all materials susceptible to water damage be elevated on boards to prevent standing water from wicking into the material.
- Construction Scheduling – relieve owner-driven, aggressive construction scheduling. This practice results in out-of-sequence work such as early sheet rock installation (or other finish trades) on lower floors prior to the completion of all concrete floors, in advance of tower crane disassembly and ensuring the roof is water tight. This results in moisture intrusion far in advance of occupancy. This is how downstream occurrences may start.

When should an owner consider involving other professionals to validate occupant health effects or to assist in resolving a building failure? Generally, a trade contractor is brought in to remedy the building failure, which is often assumed to be the catalyst for the occupant IEAQ complaints. In tandem with this response, there may be a call to an Indoor Environmental Professional (IEP) or remediation contractor. When the emergency has subsided and, if the incident moves to litigation, design professionals and physicians are engaged for forensic services in order to assess damages and blame.

I *f an incident is driven by health concerns, then the solution must be as well. A parallel track evolves once there is an acknowledgement to assess this inter-relationship between occupant health and building science. The following graphic demonstrates the process stages which are common to occupants and buildings.*



Hypothesis development starts with a detailed evaluation and work-up of patient history and building characteristics. It requires the application of medical and scientific principles to building diagnostics and remediation.



Occupant diagnoses and root cause assessment are critical and require the right medical and environmental expertise. Absent parallel assessments, the costs and effectiveness associated with remediation plan development and incident resolution are random.

Indoor Environmental Professionals

The IICRC's S520 recognizes the health and safety aspects associated with the building conditions causing remediation activities. Specifically, it states "when the services of an IEP become necessary...the work relationship and task coordination between the remediator and the IEP become elements important to the successful completion of the project."

The NADCA Standard ACR 2005 defines an IEP in its glossary as: "An individual who is qualified by education, training and experience to perform an assessment of the fungal ecology of property, systems and contents at the job site, create a sampling strategy, sample the indoor environment, interpret laboratory data, determine Condition 1, 2

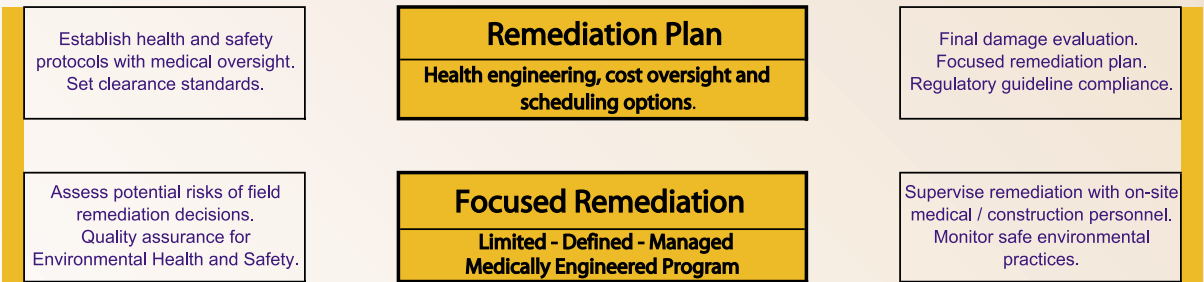
and 3 status for the purpose of establishing a scope of work and verify the return of the fungal ecology to a Condition 1 status (See IICRC S520)."

Health Professionals

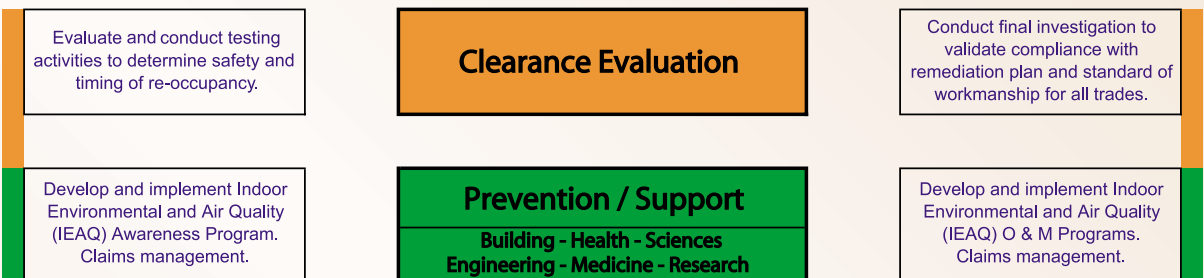
The IEP's role evolves from the IEAQ incident and may extend to the evaluation of pre-incident conditions relative to root cause determination. However, neither the definition nor the role of the IEP sufficiently addresses medical qualifications to determine the validity of health complaints which can drive the life span and costs of an IEAQ incident beyond clearance and into the litigation arena. Historically, a physician's involvement occurred during litigation when occupant health effect claims were addressed with provable



Depending on the circumstances and the degree of occupant sensitivity, outrage factors, misunderstandings and Internet-based misconceptions, the incident may demand credible risk communications. These are often complex as the process must embrace both the internal stakeholders and the media.



Guidelines create specifications which are recognized for work condition parameters and general methodology to establish performance criteria for end result remediation acceptability. They do not address health clearance from the public health perspective. All guidelines recognize health as a separate discipline. Health expertise needs to be incorporated into a focused remediation plan.



Clearance should validate remediation plan compliance with an occupant health component to form the basis for critical environmental incident closure and long-term proactive prevention.

science. Realistically, early and effective intervention by a physician can assess whether a causal link exists between the IEAQ incident and occupant claims.

IICRC and NADCA address health in terms of Personal Protective Equipment (PPE) for the remediation workers and building health with cross-contamination containment, but neither organization directly addresses occupant health. However, it is the unspoken occupant health concerns that are the underlying driver of the remediation effort.

The New York City Department of Health (NYCDOH) & Mental Hygiene Bureau of Environmental and Occupational Disease Epidemiology's *Guidelines on Assessment and Remediation of Fungi in Indoor Environments 2000* (NYC-

DOH Guidelines) stated purpose was to "develop policies for medical and environmental evaluation and intervention." It continues as "intended for use by building engineers and management, but is available for general distribution to anyone concerned about fungal contamination, such as environmental consultants, health professionals or the general public." It adds that "individuals with persistent health problems that appear to be related to bio-aerosol exposure should see their physicians for a referral to practitioners who are trained in occupational and environmental medicine or related specialties and are knowledgeable about these types of exposures."²

The IICRC S520 and ACR 2005 reference or rely on the generally accepted NYCDOH Guidelines, as do most



remediation protocols, making them the major source of information on the occupant health component and the need for occupational and environmental practitioners.

Health Guidance is Critical to Incident Management

Health concerns are not the only hidden cost drivers to resolving IEAQ issues. The ensuing, incident-related remediation protocols and activities also impact remediation costs. Health guidance is critical to the remediation contractor, workers, building occupants and building owners. Until the health concerns are addressed, the stigma associated with remediation may cause problems for the building's management and be troublesome to the occupants.

Occupant Health and Building Science—An Integrated Solution

The desired outcome at any stage in the incident life cycle follows the public health model by integrating the diagnosis of occupant complaints with the building science analysis of

the building failure, ensuring that an IEAQ incident is properly managed to a safe and healthy indoor environment. This inter-relationship requires multi-disciplinary and professional team members at the design, build and maintain stages in order to mitigate IEAQ incidents. The common goal should be to promote health, safety and productivity of occupants while protecting the financial and physical health of the building owner's assets. ■

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References

- ¹Managing the Risk of Mold in the Construction of Buildings Guidance for Building Owners, Construction Contractors and Other Parties in the Construction Process, First Edition: March 2003.
- ²NYCDOH Guidelines, Paragraph 4 – Hazard Communication (excerpted and condensed).

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