



ECOH
Environmental Consulting
Occupational Health

MOULD AWARENESS, REMEDICATION & PREVENTION

PRESENTED BY:

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WHO WE ARE



ENVIRONMENTAL

- Environmental Site Assessments (ESAs)
- Soil and Groundwater Remediation
- Aboveground and Underground Tank Management (UST/AST)
- Decommissioning/Demolition Management
- Record of Site Conditions (RSCs)
- Environmental Risk Assessment
- Potable Water Sampling
- Environmental Compliance Approvals (ECAs)
- Legal Testimonies
- Peer Review



HAZARDOUS MATERIALS

- Assessments, Sampling and Analysis
- Risk Assessments, Surveys
- Hazardous Materials Investigations
- Inspections and Air Monitoring
- Hazardous Materials Training
- Abatement Project Designs
- Project Management
- Peer Review



OCCUPATIONAL HEALTH & SAFETY

- Water Damage Assessments
- Occupational and Industrial Hygiene Surveys
- Mould and Bacteria
- Radon
- Health & Safety Audits
- Indoor Air Quality (IAQ) Assessments
- Noise Surveys
- Confined Space Assessments
- Health & Safety Program Development
- Infection Control



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AGENDA

- What is mould?
- What are the health effects of exposure to mould?
- Causes of mould growth in indoor environments
- Regulations and guidelines
- Best practices and what to look for when conducting mould investigations
- Mould remediation procedures
- Inspections and air sampling for mould remediation projects
- Mould prevention strategies for building managers during leaks and floods
- Best practices during building design and construction to minimize the potential for mould

WHAT ARE MOULDS?

- A type of fungi
- Simple, microscopic organisms
- Found in every ecological niche, indoors and outdoors necessary for recycling of organic materials
- Need external food sources



A WIDE VARIETY OF COLOURS & APPEARANCES



May Appear:

Cottony

Velvety

Granular



Colour May Be:

White

Grey

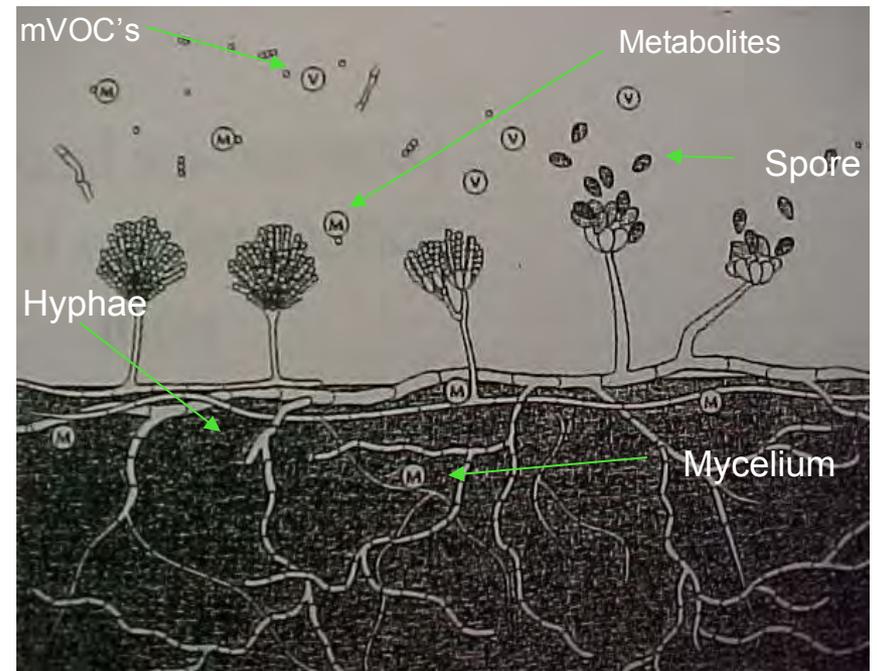
Brown

Black

Yellow

Greenish

STRUCTURE OF MOULD



FOOD

- ▶ Food sources:
 - Most cellulose materials – wood, paper, plant parts, cotton, wool, compost, skin scales, dust & most foods.
 - Dead organic material



MOULD GROWTH

Mould becomes an issue only when it starts to grow where it is not supposed to i.e. Indoors

To grow mould it needs;

*spores

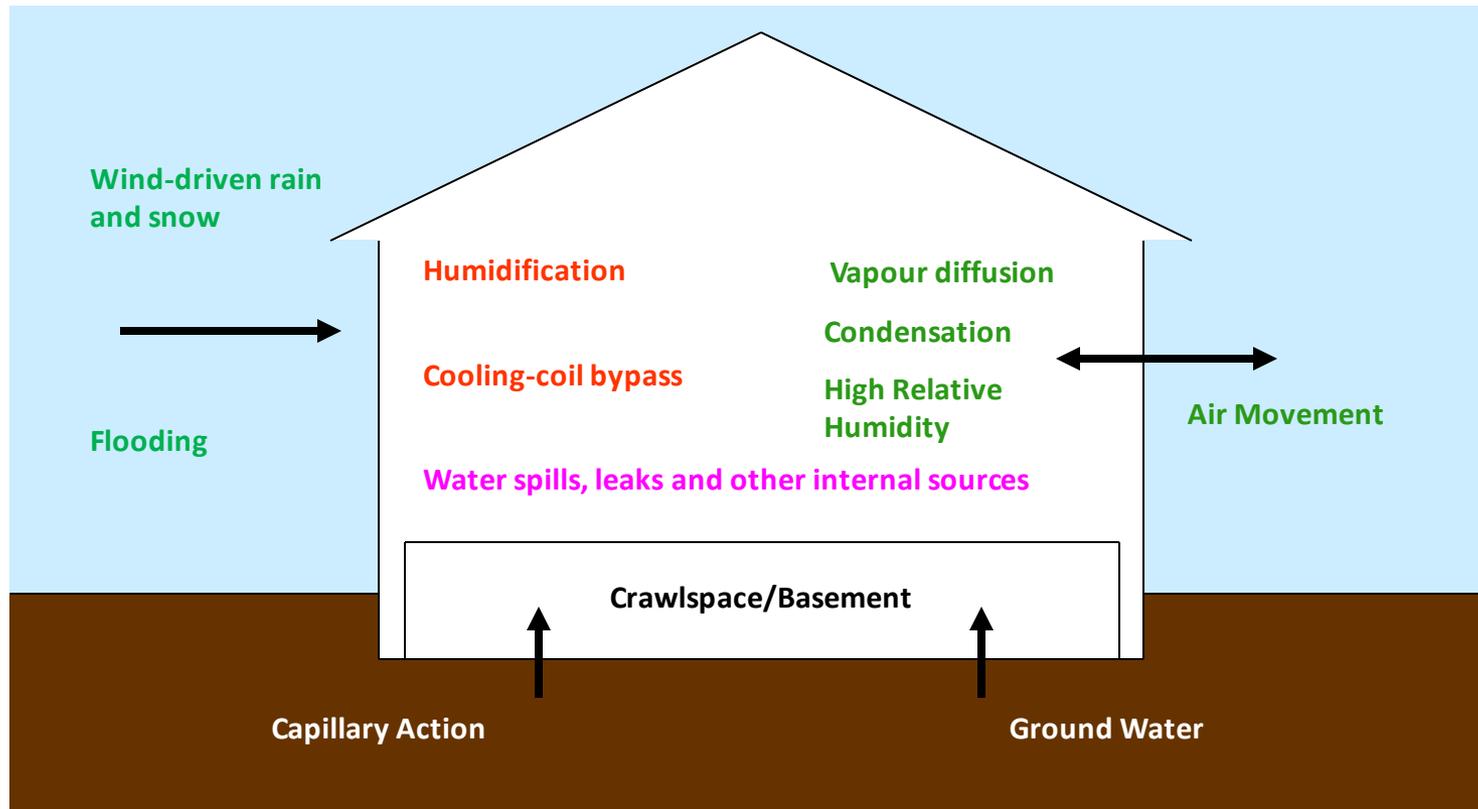
*food and appropriate conditions such as temperature

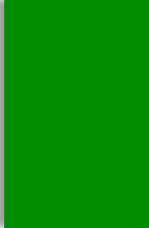
*moisture/water

An indoor mould problem is invariably associated with poor indoor air/environment

Mould is really a symptom of poor design and maintenance of buildings and building systems

SOURCES OF MOISTURE IN A BUILDING





HEALTH EFFECTS OF MOULD



EXPOSURE TO MOULD

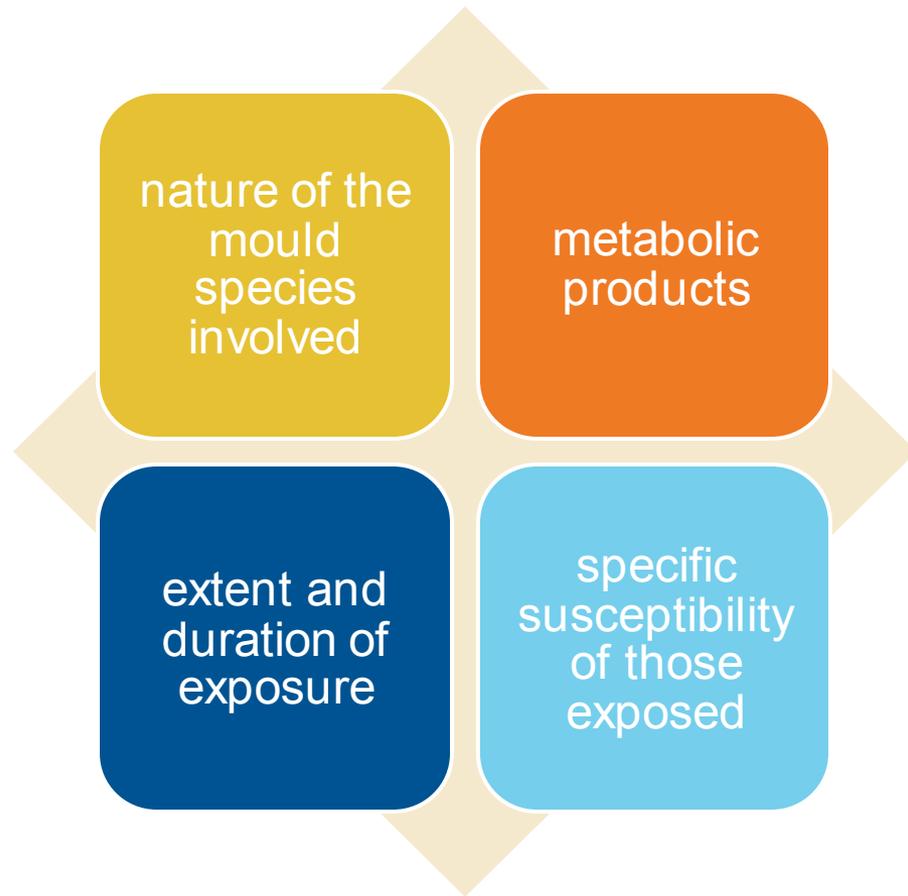
EXPOSURE CAN OCCUR THROUGH:

- Inhalation
- Physical Contact (dermal exposure) or
- Ingestion

OF:

- Spores
- Fragments or
- Metabolites

HEALTH EFFECTS DEPEND ON:



TYPES OF HEALTH EFFECTS

Allergy

Infection

Irritation

Toxicity

POTENTIAL HIGH-RISK GROUPS

Immune-deficient

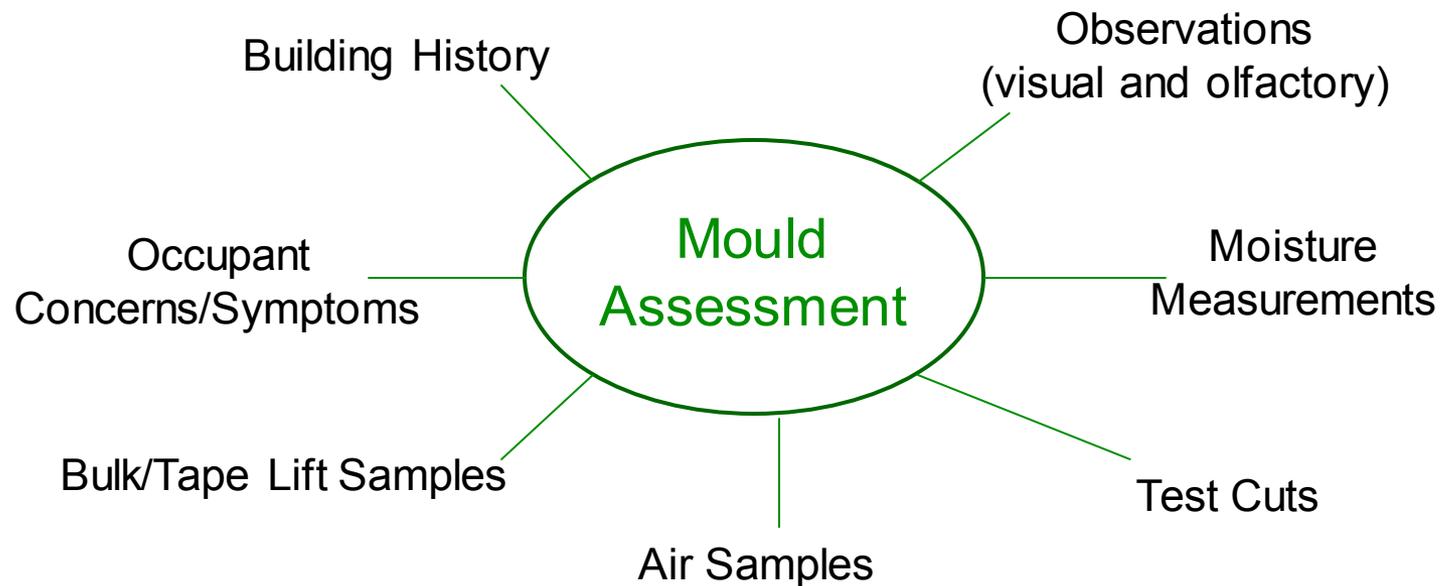
Elderly

Children

Pregnant women

Patients with Respiratory system problems

MOULD ASSESSMENT

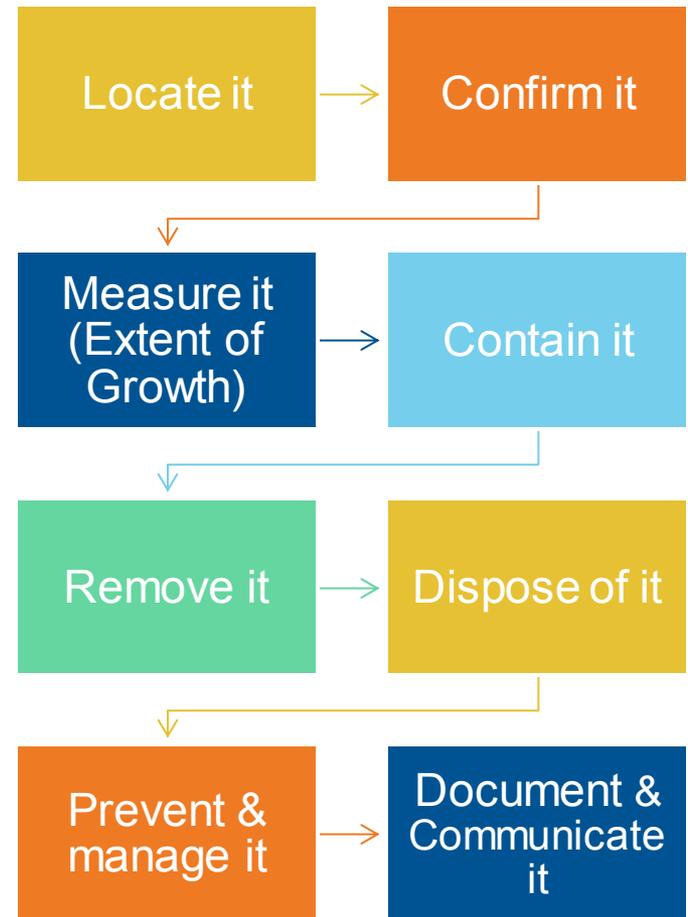


REFERENCE DOCUMENTS

- ▶ CCA Mould Remediation Guideline (2018)*
- ▶ EACO Mould Abatement Guidelines (2015)*
- ▶ ASTM D7338-10
- ▶ AIHA publications
- ▶ Health Canada
- ▶ US EPA

***links will be provided in PDF copy of this slide deck**

GENERAL PRINCIPLES



SOMETIMES, IT JUST ISN'T HARD
TO FIND AT ALL.....



AND SOMETIMES, IT'S EVEN EASIER!!



VISUAL OBSERVATIONS

- ▶ Mould growth is usually hidden – need to look for evidence of moisture damage to identify potential mould-impacted areas

Musty smell

Ceiling tiles, carpets (stains)

Breaks or cracks in exterior walls

Efflorescence

Window sills and cold surfaces (condensation)

Peeling wallpaper, blistering paint

HVAC systems (filters, insulation, coils, condensate trays, etc.)

Damaged or missing vapour barriers (structural and mechanical)

MOULD REMEDICATION



[HTTPS://HOMEGUIDE.COM/COSTS/MOLD-REMOVAL-COST](https://homeguide.com/costs/mold-removal-cost)

CANADIAN CONSTRUCTION INDUSTRY/EACO MOULD GUIDELINES

Level 1: less than 0.3 m²
(10 Sq. Ft) of mould growth

Level 2: between 0.3 m² and
3 m² (100 sq. ft) of mould

Level 3: greater than 3 m²
(100 sq. ft) of mould

MOULD REMEDIATION – CLEANING METHODS

- ▶ Removal of material (porous materials)
- ▶ HEPA vacuuming
- ▶ Damp wiping with detergent solutions or mould cleaner
- ▶ Wire brushing and/or sanding (structural wood)
- ▶ Abrasive blasting (i.e. dry ice)
- ▶ Other standards/regulations may supersede requirements for mould remediation (i.e. presence of asbestos, infection control, etc.). Use procedures that provide greatest amount of occupant and content protection

CLEARANCE INSPECTION AND AIR SAMPLING



- ▶ Visual confirmation that all mould growth is removed. Carefully check remaining wall and ceiling cavities
- ▶ Clearance air samples should only be collected 12 hours or more after final cleaning and negative air units should be kept operational until acceptable results received
- ▶ Consider quality of make-up air if collecting clearance samples
- ▶ Air sampling results should be compared to outdoor and indoor reference samples

PREVENTION



MOULD PREVENTION STRATEGIES DURING LEAKS AND FLOODS



- ▶ Have a protocol already in place to deal with floods – response time is critical
- ▶ Identify and repair moisture sources
- ▶ Prompt drying within 24-48 hours
- ▶ Use bulk water extraction and aggressive drying methods
- ▶ Dry structural cavities (remove baseboards, drill holes, prop up or remove insulation)
- ▶ Monitor regularly to confirm areas are completely dry

BEST PRACTICES DURING BUILDING DESIGN AND CONSTRUCTION

- ▶ Install a gap along bottom of walls and furniture
- ▶ Material substitution – dense glass, green board, cement board in place of conventional drywall
- ▶ Minimize laminated surfaces (i.e. wallpaper and other wall coverings) and pre-fabricated wall panels (unless easy to remove)
- ▶ Separate base for millwork with moisture barrier to prevent wicking
- ▶ No back panels on millwork or use metal strapping to create gap
- ▶ Integrated baseboards for high use washrooms and other wet areas
- ▶ Avoid thermal bridging along exterior walls

BEST PRACTICES DURING BUILDING DESIGN AND CONSTRUCTION

- ▶ Appropriate scheduling of work in construction projects to minimize potential for water damage and possible mould growth - roof, windows, drywall/insulation install, leveling compounds, curing concrete prior to enclosing building, etc
- ▶ Appropriate storage of building materials
- ▶ Ensure roof and floor drains are actually in lowest spots and away from air-handling units
- ▶ Positive grading slope around buildings
- ▶ Removal of any bulk water infiltration
- ▶ Ventilation/humidity control during construction



Waterproofmag.com

HOW CAN ECOH HELP?

- ▶ Moisture and mould assessments
- ▶ Investigate employee and tenant complaints
- ▶ Designated substances surveys prior to mould abatement
- ▶ Scope of work/specifications for hazardous material abatement
- ▶ Inspections and air sampling for abatement
- ▶ Infection control measures
- ▶ Design review and construction inspections to identify conditions conducive to mould growth

Q&A

QUESTIONS? GET IN TOUCH WITH ROB.

Rob Fernandes is a skilled Certified Industrial Hygienist who has supervised numerous hazardous materials surveys and abatement projects for a range of residential, industrial, institutional and government sector clients. The many projects Rob has undertaken include indoor air quality assessments, design, and supervision of fumehood (perchlorate) removal, confined space assessments and programs, training programs, heat stress assessments, hospital infection control, and contamination assessments, and major asbestos assessment and abatement operations. Rob has extensive knowledge of microbiology and is a widely sought expert on mould. He has designed and delivered training programs on mould control and managed numerous multi-facility mould assessment and abatement projects.



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Q&A

MOULD HEALTH EFFECTS

- **Are there some mould types that are more hazardous than others, and if so, which ones?**
 - ▶ Rob: “The response to mould is very immune driven. Because everyone responds differently to mould, the hazardous impacts are dependant more on the individual than the mould type. Stachybotrys or ‘black mould’ is known to have negative effects on human health, but so can all mould types.”
 - ▶ **Additional info:** There are several species of *Aspergillus* that are of particular concern in healthcare facilities due to their potential to cause infections in immune-compromised individuals.
 - ▶ All moulds can be potentially hazardous so getting rid of it and preventing it from coming back into the building is the key to reducing health impacts from mould.”

Q&A

MOULD HEALTH EFFECTS

- **Are health risks possible after prolonged exposure to mould even if a person has little or no symptoms?**
 - ▶ Rob: “Mould health risks often present as an immune response, and it is possible to eventually develop an allergy to it if it is a problem. If you’re exposed to mould after months and months and it’s not negatively impacting your health in terms of symptoms, that shouldn’t be relied upon as an indicator for mould actually not being a problem.”
 - ▶ If mould is in your space, it is best to get rid of it versus taking a chance that it will not bother your health long term. The mould issue could also be worse under the surface. On the surface of the wall, it may appear small, but could be growing on the back of a wall or in the wall cavity and down the road, an illness could result.”

Q&A

MOULD ASSESSMENT

- **Are hyphal fragments in air samples indicative of an active mould issue? If so, what levels of these fragments would indicate an issue?**
 - ▶ Rob: “Typically, hyphal fragments do not travel as far in the air as spores (they’re not designed to be airborne, but they can become airborne as they’re small enough). Due to this ‘airborne travel restriction’, hyphal fragments in air sample results might indicate that mould is growing nearby. Typically, outdoor air won’t have a lot of hyphal fragments, just mould spores. So yes, hyphal fragments in air samples can be an indicator of mould growth.
 - ▶ As far as numbers, any amount of hyphal fragments may indicate a mould issue.”

Q&A

MOULD CLEANING AND REMEDIATION

- **Is it safe to use bleach to clean mould?**
 - ▶ Rob: “Bleach can be used if it’s used correctly and with the proper cautions, PPE and concentration, but it is not necessary. Soap and water does just as good a job as bleach in many circumstances.”
 - ▶ Using bleach is not recommended unless extreme caution is exercised.”

Q&A

MOULD CLEANING AND REMEDIATION

- **Is there a biological, natural control for mould?**
 - ▶ Rob: “Not really, as if there was, mould would not exist in the outdoor environment (i.e. spores are resistant to UV breakdown so they can perpetuate in sunlight!). However, there are plant-derived ‘botanical’ chemicals that are antimicrobial and antifungal.
 - ▶ Similar to how some moulds fight bacteria (e.g. penicillin antibiotic is derived from the *Penicillium* mould!), there are plants that can resist mould as well. These plants have been used to create natural based products that do work for disinfecting and removing mould.”

Q&A

MOULD CLEANING AND REMEDIATION

- **If not bleach to clean black mould on windows, how about rubbing alcohol, hydrogen peroxide, dish soap or Pine Sol?**
 - ▶ Rob: “The ideal is a chemical that helps remove mould rather than killing it in place. Hydrogen peroxide might kill it but we generally want it physically gone as well. Even dead mould spores can cause allergic reactions so we are looking for visibly clean surfaces.
 - ▶ Soap and water should do the trick so long as you see it visibly come off.”

Q&A

MOULD CLEANING AND REMEDIATION

- **Given how dusty dry-ice blasting is, how do you ensure that you are not making a bigger mess?**
 - ▶ Rob: “Dry ice blasting is great in that you can clean a large area very quickly. But it does create a lot of mess that will require cleaning. Saves manual scrubbing, but when done, it requires a lot of HEPA vacuuming and wet wiping down of the dust. It’s a trade-off!”
 - ▶ **Additional info:** Manual wire brushing and sanding also leaves a similar mess that would require follow-up cleaning.

Q&A

MOULD CLEANING AND REMEDIATION

- **There is a mould control product that lists trisodium phosphate and sodium carbonate as active ingredients. What are your thoughts on that?**
 - ▶ Rob: “Basically, the product is like a baking soda-based product which does work. The sodium bicarbonate dries out the mould spores, almost crushing the mould spore and rendering it inactive.
 - ▶ It is a good mould inhibitor, used in the industry and is relatively safe to use. Long term, however, it doesn’t prevent regrowth if a new moisture source springs up.”

Q&A

MOULD, BUILDING DESIGN AND HUMIDIFICATION

- **Are you familiar with smart air barriers [to reduce condensation and potential mould growth]?**
 - ▶ Rob: “Any air barrier that is fully intact should work to prevent humidity from getting inside a wall cavity.”

Q&A

MOULD, BUILDING DESIGN AND HUMIDIFICATION

- **Dehumidifiers and operable windows can prevent environmental conditions conducive to mould growth, correct?**
 - ▶ Rob: “Yes. A lot of systems geared towards energy efficiency have to be designed for the space and working properly (enough air exchanges, enough humidity control etc.) . You have to be careful to provide the right amount of ventilation.
 - ▶ A lot of buildings now are very airtight for energy efficiency purposes, but it can be a bad thing for mould if there is a leak or a flood. It is important to balance out the two.”

Q&A

MOULD, BUILDING DESIGN AND HUMIDIFICATION

- **Can humidifiers in the home be a source of mould growth. Do you recommend against using them in the home?**
 - ▶ Rob: “The humidifier machine itself can be a source of bacterial and mould growth (if water is sitting inside it all the time) so checking and cleaning it regularly is important.
 - ▶ Creating extra humidity in the room itself may or may not be a problem. In the wintertime we often need to create extra humidity, but in an older building especially with cold exterior walls and windows, condensation is possible which can lead to mould growth. It’s about finding a balance via monitoring what it does in the space and what happens to the space when you’re using a humidifier.”