

Rev 22/4/22

What you don't want but must know about mould

This paper gives you hard facts and was written because the public often request a quote which is then compared to half a dozen other companies goods and services. Seems unrealistic to quote against cost when there is no specification so here's some information that should alert the discerning client and help identify value for money and perhaps prevent worsening health symptoms.

Identifying Mould and Building Related illness

There are three types of mould sufferers

1. Those that imagine they have building related mould illness and their doctors or family tell them it is all in the mind and psychosomatic. I have been there and ended up in intensive care
2. Those who are lucky enough to have their symptoms professionally and medically assessed and supported by an IEP (Indoor Environmental Hygiene) expert.
3. Those who instinctively know their symptoms are building and mould related

I have yet to meet a client who was wrong about their fear that their home made them ill.

Who can medically assess mould illness?

I very much doubt your GP or local hospital in the UK will as they don't apparently recognise mould illness except *Aspergillus fumigatus* which is an incurable (but manageable) lung infection.

Your best bet in the UK is a Nutritionist who specialises in the subject, some are listed on Building Forensics website. We don't pay or receive commission from anyone.

Who can assess the home for building related illness?

This is a very simple question and will depend on who's asking and what results are required.

Insurance Company Experts

These are companies who work for insurers almost always telling policyholders there isn't a health risk or hazard and mould is normal and used for beer and bread making. These companies bristling with PhDs often in some obscure subject but in my experience use inappropriate science and their report findings never stand scrutiny regarding health risk and hazard. They seem to use inappropriate occupational (work) standards which would possibly show arsenic, asbestos or Ebola as no risk .You can reach these insurance company experts below and if you receive one of their reports you might want to engage Building Forensics

Insurance company experts

Davis French Associates

<https://www.davis-french-associates.co.uk/>

Environmental Building Solutions

<https://www.ebssurvey.co.uk/>

Pump Jockeys

These are the companies that usually have no recognised certification or training and mistakenly think a two-minute air sample will provide useful information and invariably recommend some mystical or magical mould treatment with “Trust me” as their guarantee. Just Google to find dozens of them but ask them what criteria and hypothesis their sampling follows. Ask what are pass or failure issues are and of course ask what their qualifications are. Ask why, if they take another sample next to the first it will be a very different result and the reality is total spore counts are an indicator only when used appropriately.

Indoor Environmental Hygienists

4. These are technicians skilled in all aspects of building related illness and who's certified skill sets will include, water and fire damage, indoor air quality, microbiology, decontamination, critical barriers and engineering controls, air pathways and thermography and even asbestos and VOCs. Most importantly the knowledge to utilise appropriate science and technology to assess visible and hidden health hazards and risks and work with both the client and medical professional. Qualified IEPs would usually be a qualified member of the Chartered Institute of Environmental Health.

Example of IEP Building Forensics

I have been providing independent mould and building surveys for over 20 years with 30 years' experience in disaster restoration. I have won numerous industry specific awards from disaster recovery of the year to lifetime achievement and hold the widest and highest certifications in related subjects in the UK and indeed possibly USA. My most unusual qualification is being despised by insurance companies and disliked by most major decontamination companies and I'm sure you can imagine why.

Jeff Charlton of Building Forensics IEP is recognised expert as defined by Trading Standards and you can see my accreditations on www.buildingforensics.co.uk

Restoration and decontamination

This section of the paper shows the differences between professional fine particle medically safe and risk reduction mould remediation. I must state at the outset that as a co-author to several international & British technical consensus documents on professional mould remediation, I have been reticent to provide a solution at a lower level/standard of remediation. This paper does not suggest a replacement for professional mould remediation but does provide an alternative to what is generally seen as prohibitive costs.

I would also point out that even with the most expensive mould decontamination treatment anywhere in the world, guarantees of safe remediation are never given by professional companies. They recognise exposure and client immune response triggers and synergy are impossible to quantify and as mould is always present, only risk reduction is possible anyway. Most importantly mould may be only one of many contaminants affecting health.

Professional remediation (Surviving Mold and ISEAI)

These two organisations are recognised as the Gold Standard of mould health and remediation protocols. Both recognise the multiple health issues and need for qualified Environmental Hygienists (IEP) to assess cause and effect of mould and provide a united approach with the client's medical team.

The following two organisations supported by world leaders in mould treatment promote fine particle cleaning or medically safe remediation of homes where their patients are diagnosed with CIRS and or mould related illness.

www.survivingmold.com www.ISEAI.com

The process of Medically Safe Remediation

The qualified Indoor Environmental Health professional (IEP) will develop a remediation and restoration plan following an extensive investigation of the property which must be a site wide appraisal including walls ceilings, and floors including cavities. Both current and historic water damage is identified and controlled drying, and decontamination areas are specified for the scope of works

This scope of works should be agreed with the client and contractors with targets of moisture content and decontamination established prior to works commencing. Importantly the medical team should also ideally be part of this process.

The end goal should be established with meaningful levels of clearance established as targets and agreed by all stakeholders.

What does clearance mean?

The IEP is responsible for the specification and completion and therefore will validate every stage of work to ensure nothing is camouflaged or hidden and that any new contamination or water damaged identified or revealed during the process is defined and the scope of works expanded.

Property must be dried to international and British Standards. Every square inch of visible and hidden surfaces must be cleaned. Every cubic meter of air must be cleaned and compared to reference standards.

This process is so labour intensive it will take weeks or months and is according to ISEAI and Institute of Medicine **unlikely to succeed** and the whole process will most likely require repeated cleaning and testing.

Cost escalation must be expected, and even future failure expected, regardless of multiple attempts to attain clearance.

The following brochure from ISEAI confirms these facts and in my opinion the whole process is unworkable and fraught with conflict. Significantly you will see this brochure provides an open-ended cost regarding the IEP and the client must be prepared for several attempts to satisfy the IEP regarding clearance. An open cheque book should be considered if you follow fine cleaning remediation protocols properly

I doubt you will find a responsible contractor in the UK that would undertake fine particle mould remediation if they knew their payment would depend on professional clearance standards of remediation.

The issues of Biological Exposure and Health and Building Related illness



A water damaged property may be expected to see bio amplification of Gram negative and positive bacteria, Endotoxins, and of course various species of mould and VOCs and chemical triggers. It is accepted that dead bio fragments are a greater health risk than whole spores. (ref WHO). Continuing exposure to the triggers is unlikely to see health improvements from any form of medical treatment. Much like putting a hand back in a fire after burn treatment. Competent decontamination with verified clearance is therefore essential if medical treatment is to succeed. This is again echoed by HERTSMI 2 scores from Surviving mold which show treatment is unlikely to succeed when specific triggers are present at elevated levels.

Professional Mould Remediation very expensive

The following two mould removal photos show professional remediation undertaken by Building Forensics on behalf of policyholders after insurers nominated contractors caused massive cross and secondary contamination during a botched water damage remediation

They show intrusive investigation to identify or reveal sources and reservoirs of mould and biological agents. The projects required the properties to be gutted, decontaminated, clearance issued and then restored.

The clients (insurance companies) required guarantees that the home was decontaminated to the best possible level. Despite walls, ceilings, and floor screed removal there were and cannot be guarantees in either property that occupants wouldn't react when re-entering the completed home. What was presented was pure data to show successful decontamination.



Both properties were gutted, and occupiers were re located for 8 months during works. Insurers paid for both projects where Building Forensics replaced insurers nominated contractors for the decontamination phase.

Objectives of Professional Mould Removal and Remediation

- Identify mould causation issues
- Identify mould presence and hidden reservoirs
- Dry affected areas or identify construction defect
- Decontaminate surfaces and air
- Verify all results

Building Forensics undertook decontamination in both contracts for insurers, with each costing over £100,000 including alternative accommodation, refurbishment and contents replacement

International guidance on medically required decontamination/remediation

The following leaflet was produced and recently published by one of USA's leading and professional medical groups specialising in mould and CIRRS.

You will note the costs of clearance and likelihood of failure and repeated efforts to provide clearance are likely to top \$50,000 PLUS.

As one of the founders and members of this ISEAI group of Indoor Environmental Professionals and doctors, I have to say I made serious complaint regarding the accuracy and usefulness of this document.

My concerns regarding this document include.

1. The continuing and unknown costs of the IEP,
2. The acceptance and knowledge that decontamination will fail and have to be repeated possibly several times
3. The amount of duplicated testing and lab fees required
4. The leaflet promotion of IICRC S520 when the same group of IEP's including me spent two years developing an appendix and support document which identified the serious limitations of the S520 standard and current protocol failures (such as HEPA sandwich) and HEPA air filtration due to stratification and many other issues.
5. The need to decontaminate the whole property and contents which is best practice but who can afford that?
6. The requirement to remove all small particles <5 micron and smaller
7. The accepted costs of 50,000 PLUS are an underestimate for often unnecessary detailing

My main criticism is the ISEAI failure to offer the average person a reasonable guideline for risk reduction at an affordable cost. It is in my opinion quite reasonable to identify alternative protocols which reduce risk and hazard and provide a safer home environment without bankrupting the client for a standard which may not be attainable?



ISEAI

Mold Remediation Factsheet #1

for patients or households
with diagnosed or probable
environmentally acquired illness
(EAI)

5 Things to Know Before You Remediate

- 1** Mold is common in spaces that have ever been damp. Mold can be **visible** or **hidden** (ie behind wallpaper, walls, cabinets, under carpets, in HVAC systems).
- 2** Mold and microbial growth that is **dead or alive** (dormant or active) can trigger symptoms and illnesses.
- 3** Remediation should typically emphasize **physical removal** of mold, **not killing** by cleaning or fogging.
- 4** Mold can **cross-contaminate** nearby environments and contents during the remediation if proper containment and controls are not used.
- 5** The **root cause** needs to be fixed. There are often building defects that need to be addressed before or during remediation.

iseai.org/resources

This is a free resource created for general educational purposes. Please read disclaimer on reverse.
Last revised date: Dec. 2021

Who is involved in a remediation?



Medical Professional

Because the extent of remediation is determined in part by the level of illness/ health of occupants, a medical diagnosis is often the starting point.

\$ Typical costs: 2-12 visits with a specialist (depending on complexity, ability to correct environment) + lab testing + treatments.



ASSESSMENT & PLAN: Indoor Environmental Professional (IEP)

An IEP conducts assessment for the homeowner to determine the appropriate plan for remediation. They do not stand to benefit from the remediation contract, and can actually help you review and select appropriate remediation bids. Where to find: ISEAI.org; ACAC.org; NORMI.org. Best if experienced with EAI, mold illness, MCS, and high-risk occupants.

\$ Typical costs: Note costs may vary widely due to home size, complexity, and region. Lower involvement - virtual consultation (\$250-\$300/hour). Moderate involvement w/ on-site assessment (\$500-\$1,750+, plus lab testing). Higher involvement w/ work oversight (\$1,500-\$5k+, plus lab testing). If not local and assessment is in-person, add travel.



REMEDICATION: Remediation Company

A trained and certified remediation company performs the work to identify and remove mold, other microbial growth, and contaminated building materials. Proper containment during this work is critical. Where to find: ACAC.org; NORMI.org; IICRC.org. Best if experienced with EAI, mold illness, CIRS, MCS, and other high-risk occupants.

\$ Typical costs: Single issue remediation w/ proper containment procedures (\$3,000+). Multiple issue (\$6k-20k+). Complex with construction (ex. roof repair) (\$15k-50k+).

RECONSTRUCTION: Contractor or Remediation Company



SMALL PARTICLE CLEANING: Remediation Co. or Other

Multiple rounds of small particle cleaning are usually needed to remove all contaminants. Part of this is usually done as part of remediation in the affected area(s). A whole-house small particle cleaning, including ductwork if applicable, is typically best practice as a final step.

Page 1 of 2

ISEAI Mold Remediation Factsheet #1

>> It's never just mold.

We use the word 'mold,' but actually remediation addresses the many contaminants found in damp buildings, including bacteria, mycotoxins, mVOCs, and fungal fragments.

Common Goals of Remediation

The goals can differ based on the property, health of the occupants, and financial considerations. Common goals include:

- Identify & fix the root causes of water damage.
- Remove mold and microbial growth.
- Small particle cleaning to remove contaminants, including mycotoxins.
- Create a healthier living environment.
- Help restore health to the occupants of the home who are negatively affected by mold, microbial, and toxin exposure. Restoring health also involves other steps including improving other environmental conditions, and medical treatment.

Common Pitfalls



Killing with Chemicals

Killing mold with chemicals instead of removing the contaminated materials is a common shortcut that can make occupants sicker. "Covering" mold instead of removing it is usually incorrect.



Not Overseen by an Indoor Environmental Professional

Receiving a formal remediation plan from an IEP and on-going involvement helps ensure that the remediation plan is complete. This often saves money in the end, avoiding low quality work and failures.



Low Quality Work or Follow-Up

If the remediation plan isn't followed carefully (including containment and small particle cleaning), a remediation can fail. Oversight and follow-up are necessary to ensure all steps are carefully executed.



Cross-Contamination

Can occur if adjacent possessions/rooms/spaces not protected while mold is being exposed, or disturbed during construction or remediation. Containment is a key step, along with proper engineering controls.



Incomplete Assessment

Fixing the 'obvious' problems, but failing to consider common sources of contamination such as basement, crawlspace, roof, attic, HVAC. Full assessment should be conducted by an IEP.



Bypassing Small Particle Cleaning

Remediation commonly fails due to the lack of proper small particle cleaning, which includes multiple rounds. Additionally, a whole house clean (including contents) is best practice.

6 Things to Find Out Before Hiring Your Mold Remediator

- ? Do they follow IICRC s520 standards?
- ? Do they remove mold rather than just treat/fog/kill it?
- ? Are they willing to work collaboratively with you, your IEP, and your physician, to determine what the best products are to use for remediation? Will they carefully follow an IEP's step-by-step remediation plan?
- ? Do they contain every proposed work area prior to remediation, use engineering controls such as HEPA air filtration devices (AFDs) inside containments, and perform multiple rounds of cleaning?
- ? What guarantees are in place? If your IEP's clearance criteria aren't met, or containment is significantly breached, do they charge extra to complete the work correctly?
- ? Are they licensed (if applicable - only certain states) and insured? Provide a certificate of additionally insured to homeowner?

Note: This factsheet is created for homes affecting persons with health concerns including environmental sensitivities, diagnosed mold illness, and/or other complex chronic illnesses. This document is by nature incomplete, but yet reflects consensus from ISEAI's IEP Committee, a group of highly experienced credentialed environmental professionals. Please see iseai.org/resources for additional information regarding the authorship of this educational series.
Disclaimer: This is for general educational purposes. This does not cover all possible scenarios or local specifics. Some states and jurisdictions have licensing or other laws that govern remediation practices. Please get individual advice from your own licensed medical and environmental professional before undertaking remediation. **Remediation efforts that don't follow highest industry standards can make occupants sicker.**

2 of 2

Decontamination protocols available in UK

The following systems and products are available in the UK. From our testing post remediation over the years, we have found none provide the level of decontamination required or even expected and all leave potentially harmful inhalation residue.

Prospective client should simply ask any company providing the decontamination:

“Can I see verifiable evidence of decontamination, Who and how will you verify and are there harmful by products or residue?”

If the product is to kill mould it will if capable, which none are, of leaving a toxic residue and you must ask about this residue in your home.

The residue will be chemical and fragments of spores and hyphae from desiccated spores and the World Health organisation state fragments are 40 time more hazardous than whole spores.

Some interesting factors regarding protocols used by decontamination experts in UK.

All sanitising or biocidal chemical must pass British and international standards, and this means the chemical or process must be proven in practical situations

This means differing testing criteria must be satisfied which includes:

Surfaces must be clean, and all organic material (dirt) removed to allow the product to work. None we have seen or are even remotely likely to pass this test regarding mould spores which incidentally are organic.

A very famous scientific test by Wilson et al showed immersion of mouldy plasterboard in 6 fresh solutions over a period of 1 hour failed to kill the mould. Now consider wiping instead of immersion.

Just a word about qualifications

Be aware that many of the companies offering surveys and mould related services have completed very limited qualification such as BDMA or City and Guilds 3-day courses. YES 3 days and they will advise you on your health risks, contamination hazards of bacteria and mould, and the decontamination of air and surfaces. They may even advise total disposal of contents and demolition of your home or even worse, that it will not be a health hazard after their proposed treatment You might think it reasonable to ask how they intend to verify their reports and works.

Some of the decontamination failure protocols include:

Chemspec 429

Most chemical disinfectants even bleach are de-activated by organic materials such as paper, leather, soiling etc. In a practical situation Chemspec 429 is often quoted as being used in hospital trials. In the published trial the hospital followed manufacturer's directions of

use. Clean the surface. This was found to remove over 90% of contamination and the additional spray of chemical had minor advantage but was accredited for the mass decontamination of 94% reduction of bacteria

Hydrogen peroxide

Hydrogen Peroxide is a known and acceptable oxidising and sanitation product which many use. The effectiveness as per British standards will depend on "Dwell time" and actual saturation of the target organism. A dry fog will obviously not saturate anything, and evaporation rates means almost no dwell period. This chemical can cause spontaneous explosion and catch fire to organic materials on contact subject to concentration. Leaving aside the dry fog failure to soak or saturate, create a prolonged dwell period, what exactly can this protocol achieve? Nothing other than a temporary air clean where fallen particulates will quickly re aerosolise as the peroxide evaporates.

Peracetic acid (PAA)

This is fogged around the homes by some companies as a mould treatment. PAA has a low occupational exposure level and PPE is required if airborne which of course it is. It is unstable and produces 3 compounds and there are currently no NIOSH safe limits of exposure, and it can leave a residual possibly toxic residue. NIOSH has proposed only 0.64 ppm is immediately dangerous to life and health (IDLH) which is currently under review.

<https://workersafety.3m.com/is-peracetic-acid-a-problem-ppe-you-should-consider/>

Ozone

This product is extremely toxic and should not be used in an occupied home. The USA has a maximum exposure level of only 0.050 parts per million and it is generally illegal to sell ozone generators for cleaning the air.

While ozone can be used commercially it can have extremely dangerous consequences in the home including explosion and destruction of rubber and fire risks.

Ozone can also react with household products containing terpenes to produce formaldehyde which is a carcinogen

The following link is to A USA government site which lists equipment you shouldn't use as air purifiers some of which used in UK <https://ww2.arb.ca.gov/our-work/programs/air-cleaners-ozone-products/potentially-hazardous-ozone-generators-sold-air>

HEPA air filtration or negative air pressure machines

An almost complete waste of time. Here a machine is located on the floor and air is pulled in through a HEPA filter which is going to trap particles down to .3 of a micron. Sounds very good except it doesn't work effectively in this scenario

Firstly, a study by Bob Brandys PhD of HEPA machines found that most machines transported from job to job are found to leak due to seals being damaged in transit.

Secondly a study by the HSE shows the smaller particulates <5 micron remains airborne for days and don't fall to the ground but remain in the upper inhalation zone. These machines actually cause the turbulence to keep the fine particles airborne.

The study by HSE also goes on to show stratification of particles and buoyancy and aerodynamics of individual particulates will dictate what level (height) they float.

Companies that purport to decontaminate mould affected properties.

Bio Sweep

This free-standing machine pulls air in through a filter from a small vacuum motor. The air is now processed with ozone, which is a health hazard with strict legislative limits, and hydrogen peroxide. Two very clear questions. This is designed to kill the mould spore, but due to the milli second pathway through the machine how successful is that?

What happens to the dead spore which would be 40 times more hazardous than whole viable spores? If the processed air is then filtered to trap particulates why not simply vacuum the air through a HEPA vacuum cleaner?

The final question would be How can this floor mounted machine process air in the respiratory zone and above (higher than the machine) when its known that's where the real hazard is kept float by the physics of Brownian motion. Simply ask for independently verified post remediation clearance testing and see what happens.

Pure Maintenance

A remarkable service which appears to have re invented science

They promote dry fogging of hydrogen peroxide and evidently add peracetic acid too.

They explain the dry fog of only 3 microns saturates the mould spore whereas bigger droplets bounce off. Remarkable. They explain the .3 droplet is a gas when of course a gas is at a molecular size and .3 of a micron is recognised as a particulate which can by pass all human defences.

PM state the dry fog is pressurised and can enter voids and cavities but fail to explain how something released into the air can suddenly develop a pressure differential.

A simple question might be if the fog is forced into cavities what comes out of that cavity and of course it would be contamination, which might explain why we have found post treatment contamination higher than before it was engaged.

They state their chemicals are nontoxic, but a review of the components appears to show this is wrong. See Peracetic acid safety data <https://workersafety.3m.com/is-peracetic-acid-a-problem-ppe-you-should-consider/>

They state 99% of mould is eradicated and I think this would be difficult to prove in any test using any product in the world let alone a 1-hour dry fog. Simply stated it is not eradicated and the inhalation hazards may actually increase.

Photographic evidence in their "White Paper" shows the disappearing of mould after 1 hour, but they fail to explain this isn't removal just bleaching.

They also quote a benefit as denaturing the mould spore. Nobody is quite sure if this means kill the spore, prevents it from growing but I think it's clear a dry fog of limited dwell time won't make harmless the inflammagens and chemical properties.

In all cases the simplest answer is to get 3rd party verification of any decontamination rather than rely on "Trust Me"

End