TO THE COURT

REPORT AND SCHEDULE OF WORKS
ON
INDOOR ENVIRONMENTAL CONDITIONS

This redacted report was undertaken and paid for by a family of 11, 10 of whom were suffering negative health effects. The report shows the incompetence and failures of and contractors and dry fog decontamination which apparently increased contamination. The report has been allowed by the client to be be released in redacted form to help other families.

AT

Client REDACTED

Date of survey 10 June 2024

1. SUMMARY

I am a certified Indoor Environmental Hygienist engaged to assess the possibility of bio amplification and presence of toxigenic mould, bacteria and general inflammagens in the above property .My role is to accumulate relevant information from identifiable sources and provide a data driven report on circumstances and health risks and hazards

2. Property description

Three bedroom

.

3. Property construction

Brick and tile, suspended wood floor over a cellar

4. Weather conditions

Sunny

5. Relevant client information

5.1. Information provided by client

5.1.1. Eight of nine children display and report various health issues often associated with mould and biological exposure.

5.1.2. The children are generally under medical care by GPs and hospital.

5.1.3. Both parents, display symptoms associated with biological and toxigenic exposure.

5.1.4. These issues are confirmed and recorded by the NHS general Practitioner and landlord notified.

5.1.5. The home initially suffered damp walls and a collapse of MMMF insulation within cavity walls. This is said to have been replaced with pellets although no drying certification was received.
5.1.6. Minor levels of mould were seen developing in areas of the home and the undertook a survey by Envirovent.
5.1.7. Envirovent recognised a lack of ventilation and installed a PIV ventilation unit within the loft.
5.1.8. Within days of the PIV being installed, a distinct mould odour was recognised and reported to .
5.1.9. After some time and regular complaining, a fresh air Ventilation system was then proposed in by the landlord as the current system was clearly unsuitable.
5.1.10. There was discrepancy between landlord and environment as to who was to pay for the replacement unit and then the fitment expected for the first week of December was cancelled.
5.1.11. Tenants 7 month baby went into anaphylactic shock November 2022 and blood results received back mid December 2022 showed sensitisation to Alternaria mould. Tenants suspected unit and upon investigation discovered mould within the unit, which had bypassed the filter and was being pumped into the house. Tenant alerted landlord and sealed off PIV unit to prevent further ingress of mould and odour.
5.1.12. The loft was investigated for the first time and the roof was identified as being so decayed and damp that replacement was ordered and undertaken.
5.1.13. surveyors undertook mould survey, air quality tests and swabs. Results returned confirming the presence of various different moulds (including Alternaria).
5.1.14. Walls identified as damp/wet to bunk bedroom wall from shot external rendering and wet/missing cavity wall insulation.
5.1.15. agents “Pure Maintenance” dry fogged Peracetic acid throughout the home on two separate occasions. Including cutting hole in lounge ceiling below wet room leak.
5.1.16. This product was blown into a cavity and would have resulted in contaminated air being forced out of the same cavity, thereby increasing contamination within the property. Installed wet room prior to tenants moving in was not in fact a properly fitted wet room. It leaked underneath extending horizontally left and right to WC and above lounge ceiling below.
5.1.17. Tenants refused installation of new PIV unit as surrounding houses have log burners and therefore the proposed model is unsuitable. Tenants didn’t want original unit reinstalled that brings in the stagnant attic air as aren’t convinced the attic is mould free and no longer trust the company.
5.1.18. Tenants moved out of property for a 3 month period. Various symptoms improved immediately. Babies scalp cleared of severe, weeping skin within a matter of weeks and hair began to grow back. Upon occupancy of the house, families symptoms returned and 14 year old son diagnosed with asthma after returning to the bedroom with the wet gable wall that was not remediated as expected but damp plaster and mould simply skimmed over. NHS Blood tests taken for the baby October 2023 showed sensitisation to Cladosporium mould.

5.2. Information provided by Landlord

Reports were provided by nominated mould expert Pure Maintenance

5.2.1. PM first report dated 9/03/2023 sampled just one area in the property which showed 210 Aspergillus/Penicillium spores against outside which was below detection level.

5.2.2. The Council report shows two DNA swab test on 8/03/2023 in the Lounge and Loft.

5.2.3. The Lounge showed abnormal and very high levels of mould species that thrive in damp conditions and air quality was likely affected.

5.2.4. The loft showed elevated and abnormal levels of mould and is or was suffering moisture damage

5.2.5. **Comment on testing by expert Jeff Charlton**

5.2.6. These tests were apparently used to identify mould risk and perhaps hazard present. The testing was completely inadequate as only one DNA and one total spore count sample were taken in occupied spaces in this three-bedroom house, which cannot reflect any form of accuracy**.**

5.2.7. In the absence of accuracy, the limited sampling and analysis confirmed the presence of abnormal levels of potentially toxigenic levels of mould in the hall, lounge and loft

CONTENTS

https://www.envirovent.com/products/positive-input-ventilation-piv/piv-loft-mounted-unit/

6. INTRODUCTION

I am inspecting the property on behalf of my client ……

1.1. The prime objective of the survey is to assess indoor environmental conditions with specific focus on mould and water damage.
1.2. A second issue is to assess health and safety and possible health related triggers which may be responsible for negative health impact.
1.3. Accordingly, I visited the property on 10th June 2024
6.1. The property was occupied with a family consisting of 9 young children and their Baby. Eight of the nine children are said to suffer from building related illness. The parents both suffer building related symptoms.
6.2. All relevant symptoms have been identified and reported to family GP since the PIV loft ventilation system was installed in 2022
6.3. The levels of illness and symptoms reported to Jeff Charlton appear to coincide with known response to Chronic Inflammatory Response Syndrome, which can be identified from blood tests in specialist clinics.
6.4. Urine tests can provide similar analyses but to a lower level of confidence.

7. SURVEY SPECIFIC QUALIFICATIONS

7.1. Qualified member of Chartered Institute of Environmental Health
7.2. Scientific Member Society of Environmental Medicine
7.3. Council Certified Indoor Environmental Consultant (USA)
7.4. Hon Fellow BDMA
7.5. Senior tech BDMA
7.6. Certified Restorer (USA)
7.7. Published peer reviewed paper on mould and health issues

8. FACTS UPON WHICH MY REPORT IS BASED

8.1. This report is factually based and follows my visual inspection of the property on 10th June 2024
8.2. The report combines observed details, informed facts where identified, data collected, and laboratory analysis of samples taken at time of site visit.
8.3. My opinions are offered on the basis of an independent inspection by an experienced and certified Indoor Environmental Hygienist combining all relevant information gathered.
8.4. Informed facts are included and identified

9. EQUIPMENT USED

9.1. I have used a FLIR EBX60 thermal imaging camera or similar, Tramex moisture meters and Tramex thermal hygrometers.
9.2. Various air sampling cassettes were used to collect air samples for analysis by PCR-DNA and or genus.
9.3. Swiffer cloths or specific DNA cotton type swabs used for analysis of settled dust
9.4. Only laboratories certified to ISO standards were utilised for analysis of collected samples.
9.5. Photographs taken during the survey were recorded by a Sony or FLIR camera and none have been edited.
9.6. Infra-red thermometer to calculate Dew Point

10. Alleged defects and health concerns and targets for survey

10.1. Rhinitis
10.2. IBS
10.3. Skin issues
10.4. Complex and multiple medical issues

11. **Survey relevant Informed Facts**

11.1. Mould odour

11.2. A wet room was installed for previous tenants and was used by the Smith family. This room was not designed or installed properly and subsequently leaked affecting bathroom sub floor and lounge ceiling. (photographic evidence provided)

11.3. Leak affected lounge, pantry and kitchen ceilings. Ref 11.2

11.4. Pure maintenance, a decontamination company opened this ceiling cavity and blew chemicals into void, likely resulting in contamination blown out.

11.5. Wet walls identified by tenants and remediated by landlord by plastering over , (confirmed still wet)

11.6. Various high quality HEPA air cleaners installed by tenants in an attempt to reduce symptoms which may have affected air sampling results (reduction)

11.7. Landlord installation of PIV into loft space which led to medical issues developing

12. **Survey Observations and measurements**

12.1. There was no significant visible mould in the home other than kitchen cupboard

12.2. The home had been closed up , where all windows were closed prior to our survey**.**

12.3. The data collection showed no visible areas of concern excepting particulate counts and damp walls previously identified as wet and over plastered by contractors

13. Dust monitoring

13.1. The airborne dust concentration is measured in g/m³ or particles defined in ppm and size from .1 micron to 10 microns. Typical equipment used is the 6 Channel laser particle counter.

13.2. Fragments of mould are often in the .3 to .5-micron range although spores are invariably more than 5-10 microns.

13.3. Particle counts are taken to assist in the development of sampling hypothesis. The higher the particle counts in association with size provides us with one indicator of possible contamination sources and this may be where samples are taken.

13.3.1. The results are shown in Table 1 below

13.4. Comments on particle counts

13.5. The colour coding is added by the author to focus on areas of concern.

13.6. In Table 1 we see ambient, and loft are relatively low. In comparison the first floor is much higher than ground floor but all areas inside occupied areas are very elevated with particulates of unknown makeup.

13.7. It should be realised the whole roof was replaced and this would have removed much of any contamination present prior to works.

13.8. The greatest heath risk is less than 10 micron as the human body cannot defence against this size where particles sub 10 micron can move directly to lower respiratory system for transfer into blood stream via the alveoli. WHO estimate inhalation of particles less than 7.5 micron elevates exposure by 40 fold.

13.9. A significant issue here is the PIV system installed by has coarse filters fitted which only trap 65% of particles above 10 micron. We see in Table 1 section 13 that the levels of sub 10 micron particulates are in the thousands and therefore a major risk was installed, Not least as these reading were taken after the roof was removed for replacement purposed in 2022.

Table 1

AREA	Particle Size µ	.3	.5	1.0	2.5	5.0	10
Ambient		5403	2279	650	100	13	6
Loft		8653	3988	993	301	79	59
Main bedroom		22447	11893	3212	853	175	120
Bunk Bed		18930	10316	3346	777	126	79
WC		18405	8410	2391	590	123	86
Bathroom		18330	9409	2774	759	129	82
Bedroom 2		18792	10384	3006	771	132	97
Kitchen		15672	8036	2444	511	94	66
Dining room		13150	6012	1579	444	116	67
Lounge		16030	7392	2218	657	194	99
Front room		15640	7886	2278	631	158	100


11-01-2009
MODE:CUM
0.3um 22447
0.5um 11893
1.0um 3212
2.5um 853
5.0um 175
22.7
60.5
DP 15.4
WB 18.4


11-01-2009
20:50:08
MODE:CUM
0.3um 18930
0.5um 10316
1.0um 3346
2.5um 777
5.0um 126
10um 79
AT 21.9
RH 59.4
DP 14.3
WB 17.5


11-01-2009
20:43:30
MODE:CUM
0.3um 18405
0.5um 8410
1.0um 2391
2.5um 590
5.0um 123
10um 86
AT 21.4
RH 62.2
DP 14.6
WB 17.5


11-01-2009
20:42:25
MODE:CUM
0.3um 18330
0.5um 9409
1.0um 2774
2.5um 759
5.0um 129
10um 32
AT 21.8
RH 63.5
DP 15.3
WB 18.0

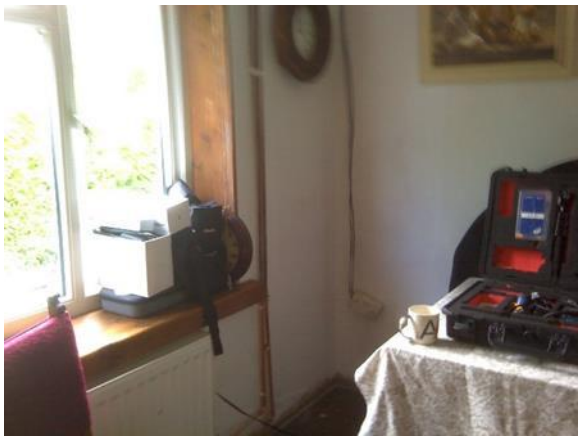

11-01-2009
20:38:42
MODE:CUM
0.3um 18792
0.5um 10384
1.0um 3006
2.5um 771
5.0um 132
10um 97
AT 22.4
RH 61.1
DP 15.2
WB 18.2

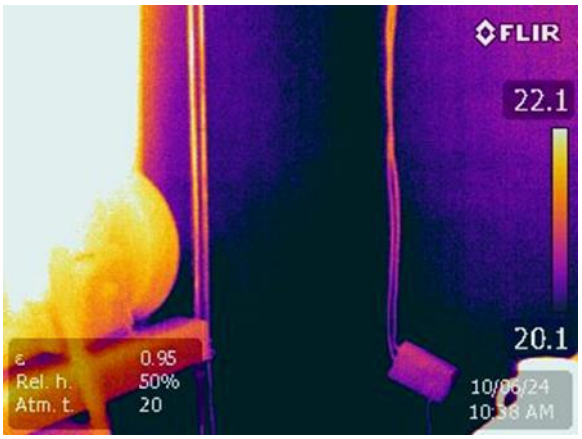

11-01-2009
20:30:47
MODE:CUM
0.3um 15572
0.5um 8036
1.0um 2444
2.5um 511
5.0um 94
10um 66
AT 23.3
RH 60.0
DP 15.8
WB 18.8

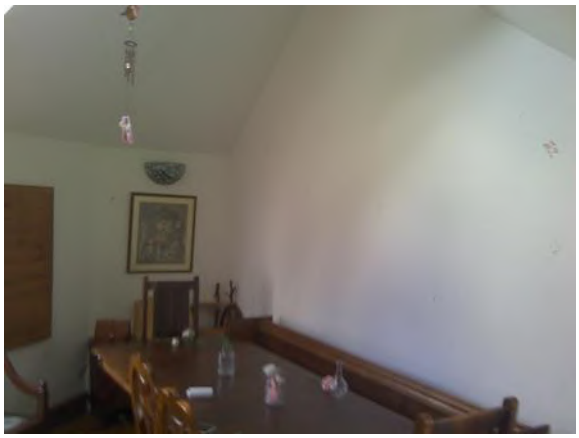
14. Thermal imaging survey

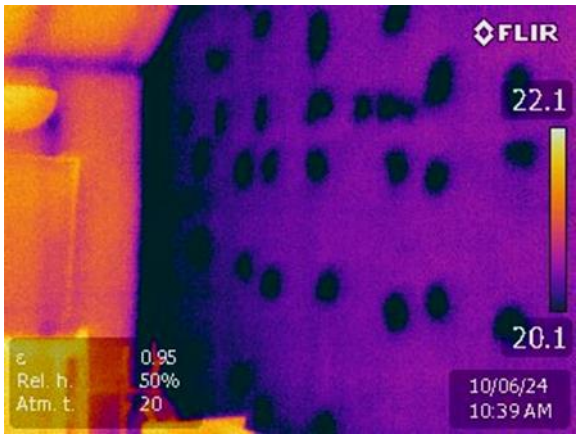
14.1. A thermal imaging camera was used to scan the building envelope and substrates to assess temperature differentials known as ΔT. These scans may identify thermal bridging, poor insulation which may lead to dew point condensation and indicate further investigation is required to assess possible, leaks, penetrating damp, wet materials or insulation.

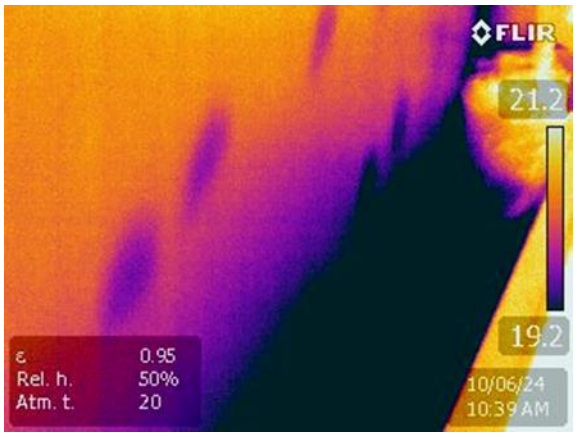
14.2. This survey often forms the basis of the moisture mapping but darker doesn't necessarily mean the substrate is wet, it can be just cold. Darker areas in the photos can indicate cooler areas and this may be associated with differing or missing insulation levels, dampness air leaks etc

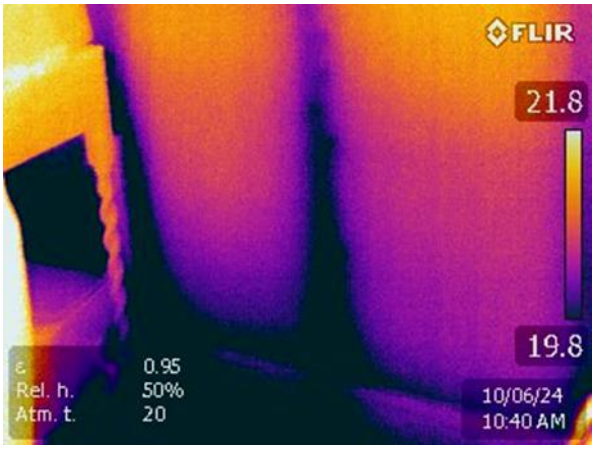


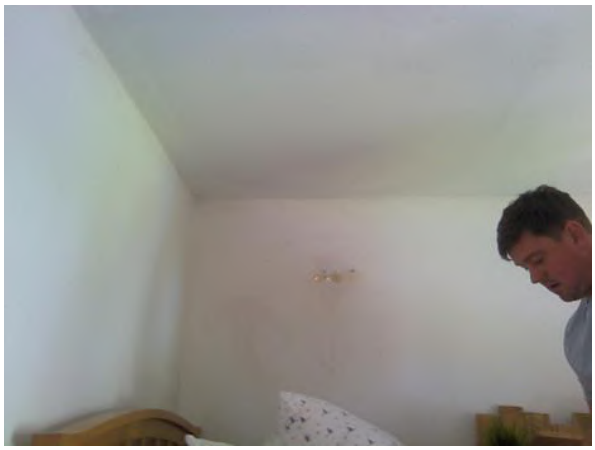


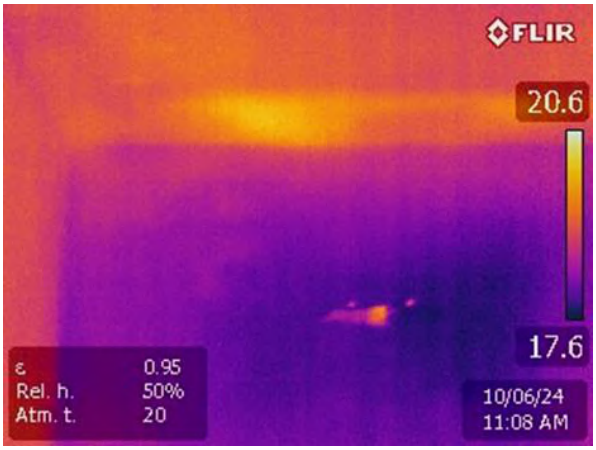




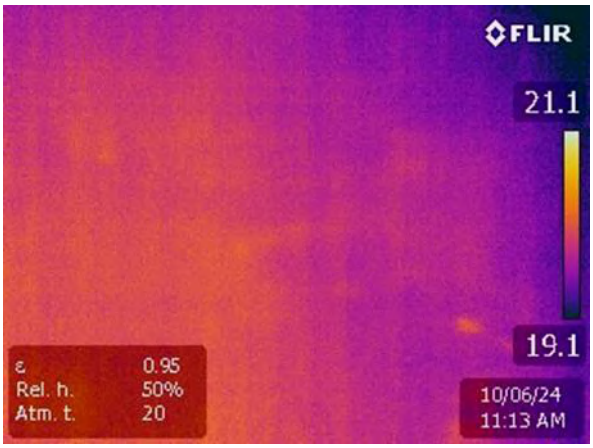




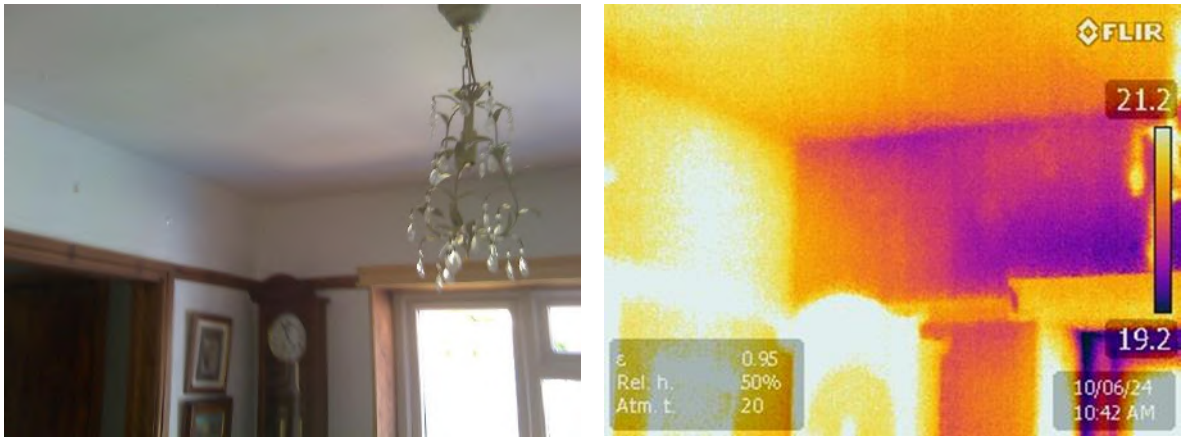




Above bunk beds (shelf removed) damp



Main bedroom wall damp wall in R/H section (confirmed in damp section)



Ceiling and wall area in lounge affected by active leak from wet room leak

Slight temperature variations but rising damp not considered an issue

15. **Moisture mapping**

15.1.1. Moisture content of various targeted substrates are measured with moisture meters calibrated for the specific material using impedance(non- penetrative) or conductive pin meters.

15.1.2. The objective here is to assess moisture issues which may be responsible for current biological amplification. Although areas may be dry, previous moisture

may have caused hidden biological growth which may remain allergenic, or an inflammagen until removed.

15.1.3. Inflammagens in cavities can be expected to leak out into the occupied spaces.

15.1.4. Measurement is assessed against recognised standards or equilibrium of unaffected areas.

15.1.5. Equilibrium for this purpose, is the expected homogenous level of moisture in the same material. Where concerns are present penetrative measurement may be required.

15.1.6. Materials DO NOT have to be wet or saturated for mould growth and a boundary layer of a few molecules of moisture can exist on top of materials which is contusive to mould growth. In fact ,mould does not grow in wet conditions and prefers damp.

15.1.7. A typical example is mould growth on window glass and fridge linings where the material is nonporous cold and internally dry, but growth still occurs on the surface. In this case a bio film is often the cause.

15.1.8. Although some materials may be dry, we also look for areas that have been historically wet and it must be recognised that any water damage will result in mould or bacterial amplification within 48 hours.

15.1.9. Biological growth (including mould) prefers damp, dark warm areas away from UV light and air movement. Ideal growth conditions are found in ceiling, wall and floor cavities. We may therefore sometimes make risk assessments in the absence of hard data.

15.2. **Standards of dry**

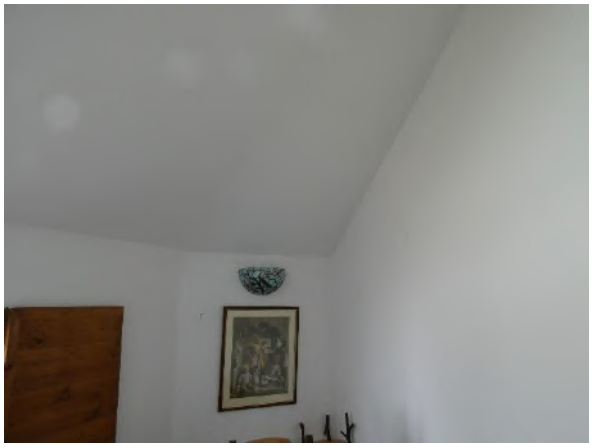
15.2.1. The tables below show typical limits regarding moisture content of various materials. Taken from British Standards PAS 64 also follow BS8201 and ASTMS F2710, Further information is available in the appendix

Structural material	MC	WME%	ERH
Wood	**16**	**16**	**N/A**
Drywall (plasterboard)	**3.0**	**12**	**N/A**
Plaster	**0.3**	**15**	**N/A**
Brick	**1.5**	**15**	**75**
Concrete	**3.5**	**15**	**75**
Sand cement screed	**6.0**	**15**	**75**

Main bedroom wall , damp in areas

Measurement taken again and found dry plaster skim applied over wet wall. The area above bunk beds showed damp risk on IR but low on conductive meter at

Kitchen cupboard wet wall (saturated) after misfitted outside tap.



Corner of dining room shows IR concerns, elevated moisture content but considered dry although previously wet mould reservoirs likely in ceiling cavity.
Note external and existing roof has known defects

The lounge ceiling is considered dry but leaks are known to have occurred from wet room

Bedroom external wall damp in sections

All walls measured found to be dry excepting noted areas

Equilibrium moisture content - *%mc guidance values*

Environment or material condition	%rh	generic wood	generic plaster	generic brick	generic cement mortar	generic sand & cement screed	generic concrete	Protimeter WME
safe air dry	25	6						6
	30	7						7
	35	8						8
	40	9						9
	45	10						10
	50	11						11
	55	12				4.7	3.9	12
	60	13				5.1	4.2	13
	65	14	0.1	1.0	1.5	5.5	4.5	14
	70	15	0.2	1.3	2.0	5.9	4.8	15
at risk	75	17	0.4	1.6	3.0	6.4	5.2	17
	80	18	0.6	2.4	4.0	6.8	5.4	18
damp	85	20	1.0	3.0	5.0	7.3	5.7	20
	90	23	1.5	4.0	6.0	8.0	6.0	23
	95	26	2.2	5.5	7.7	9.0	7.0	26
	100							27
								28
								relative
								relative
								relative
								100

PROTIMETER

Protimeter WME - wood moisture equivalent. This is the theoretical %mc value that would be attained by a piece of wood in contact with and in moisture equilibrium with the material under test. Protimeter WME measurements can be used directly to establish if non-conductive materials are in a dry, at risk or damp condition as the critical %mc thresholds for wood are known.

Note
These are standards but interpretation may be required, not least where historic water damage exists. Of significant risk is where water damage in high cellulose materials has been allowed to dry naturally.

Of significant importance is the measurement of concrete and floor slab and screed which require specific and detailed investigation as per British Standards.

The measurement of concrete and screed must follow recognised protocol which may require certain environmental factors and monitoring over 48 hours. For simplicity and to contain costs Building Forensics will adopt investigation to a lesser degree. Where certified evidence is required, a separate instruction will be required

16. Humidity ratio also known as Specific Humidity

16.1. This is a function of relative humidity and temperature and calculates the actual quantity (weight) of moisture carried in the air based on g/kg of dry air. Variations between rooms and ambient can indicate local moisture issues.

A Thermo-hygrometer with probe is used to calculate the humidity ratio. Un-controlled evaporation will result in moisture being adsorbed into porous hydrophilic materials and this may result in biological growth. Even nonporous materials can be affected by high humidity ratio especially from dew point. condensation. The following readings with decimal point are taken directly form the meter.

16.2. Dew Point Condensation

Dew point is the temperature at which warm air holding moisture condenses on colder surfaces leaving droplets and can result in mould growth. Dew point is measured by taking the temperature of surfaces, usually external walls
External walls measured show temperatures well above dew point condensation risk

16.3.

16.4. Conclusions

The specific humidity is around 9 grams per kilogram of dry air and this is accepted as reasonable, not least as the property was fully occupied and all windows were closed at my request prior to survey. This shows no lifestyle issues and no likely uncontrolled evaporation from wet substrates. This table also shows mould growth inside the property.

.

Area	Temp C	Dew Point C	RH	Humidity Ratio
Ambient	**17.4**	**6.9**	**50.2**	**6.2**
Loft	**19.6**	**9.7**	**52.7**	**7.5**
Front room	**23.1**	**13.9**	**56.2**	**9.9**
Lounge	**20.8**	**13.3**	**62.2**	**9.5**
Dining room	**21.4**	**13.1**	**59.2**	**9.4**
Main bedroom	**21.6**	**13.5**	**60.1**	**9.7**
Kitchen	**20.6**	**13.1**	**62.3**	**9.4**
Bunk bed	**19.6**	**12.4**	**63.0**	**8.9**
WC	**19.8**	**12.9**	**64.2**	**9.3**
Bathroom	**19.7**	**13.1**	**65.7**	**9.4**
Bedroom	**19.8**	**12.6**	**63.2**	**9.1**

All walls tested were 9 degrees over dewpoint and no risk.

Appendix of site humidity photos

Dewpoint Photos


SCAN
20.8
°C
MAX
21.0
100
MODE


SCAN
20.6
°C
MAX
20.8
100
MODE

Specific humidity photos


TEMPERATURE °C
RELATIVE H. %
23.1
56.2
DEW POINT °C
H. RATIO G/
13.9
9.9
T °C
RH %
DP °C
HR G/Kg
19.8
69.8
14.2
10.1
TRAMEX


TEMPERATURE °C
RELATIVE H. %
20.8
62.2
DEW POINT °C
H. RATIO G/Kg
13.3
9.5
T °C
RH %
DP °C
HR G/Kg
20.4
67.2
14.1
10.0
TRAMEX


TEMPERATURE °C
RELATIVE H. %
21.6
60.1
DEW POINT °C
H. RATIO G/Kg
13.5
9.7
T °C
RH %
DP °C
HR G/Kg
21.5
65.3
14.7
TRAMEX


TEMPERATURE °C
RELATIVE H. %
20.6
62.3
DEW POINT °C
H. RATIO G/Kg
13.1
9.4
T °C
RH %
DP °C
HR G/Kg
20.5
66.9
14.1
TRAMEX


TEMPERATURE °C
RELATIVE H. %
19.6
63.0
DEW POINT °C
H. RATIO G/Kg
12.4
T °C
RH %
DP °C
HR G/Kg
20.4
65.3
13.7
9.8
TRAMEX


TEMPERATURE °C
RELATIVE H. %
19.8
64.2
DEW POINT °C
H. RATIO G/Kg
12.9
9.3
T °C
RH %
DP °C
20.4
66.4
14.0
TRAMEX


TEMPERATURE °C
RELATIVE H. %
19.7
65.7
DEW POINT °C
H. RATIO G/Kg
13.1
9.4
T °C
RH %
DP °C
HR G/Kg
20.5
68.2
14.4
10.3
TRAMEX

17. Total Spore counts

Total Spore Counts
This survey has been developed from our experience of building related illness and the confirmation of risks identified in the basic survey 1

In this sampling protocol, we sample air and collect airborne spores in purpose made sealed cassettes for lab analysis by qualified mycologists. The results are compared to other areas and outside (ambient) air as a control. This type of sampling identifies mould genus but not species, however the levels are an indicator of risk areas.

Sample Number	Area collected
1	**Ambient**
2	**Loft**
3	**Lounge**
4	**Bed 1**
5	**Bed 2**
6	**Bed 3**

Note

Mycologists cannot distinguish between Penicillium and Aspergillus. Therefore, reports are stated as Penicillium/Aspergillus and the report is deemed a risk assessment in terms of counts and types of mould.

Lab result factors
The following tables are total spores counts (viable dormant and non-viable)
The individual samples should be compared to other areas and the outside (ambient sample)

The results may be affected by debris loading and other factors and these results form part of the methodology. Debris loading is dust which can include skin, dust mite faeces, dander and general fluff/dirt. The level of dust can obliterate the visual detection of spores when viewed under a microscope.

Debris loading is generally rated between 1 and 5 with 5 being very dirty air.
The reality is, the dirtier the air the more the mycologist relies on periphery counts and this always leads to under estimation

The lab report identifies percentage of count and total spore count

The standard report shows a column with percent of sample fields read. What that means is for each spore type the number of spores that were counted is represented by a certain percentage of fields on which they were observed. It is not the percentage of the total sample

Reporting Limits
The Reporting Limit for a spore type uses the formula listed in the section above and assumes that the lowest raw count that can be detected is one.

17. Lab analysis

17.1. The ambient outside conditions should be compared to inside genus and spore counts (levels) including the percentage identified in the analysis

17.2. Note the high debris loading (4+5) both inside and outside the property which may occlude visible identification therefore spore counts can be assumed to be higher.

17.3. Comparison between different locations should also be considered

17.4. The air testing was disturbed excepting the loft where particle counts were high, and counts were quintessential

17.5. The first comparison is Aspergillus/Penicillium. In ambient count there are 40 spores per cubic meter of air and just 1 % of the sample. However, despite a debris loading of 5* and only reading peripheral counts the loft reading was 500-999.

17.6. The lounge has 400 spores per cubic meter, bedroom 1, 93 , bedroom 2, 40 and Bedroom 3, 320 all at elevated percentage of the count.

17.7. The actual species of these Aspergillus genus is unknown but the dust samples provides this information.

17.8. What we can identify from this test is elevated and variable risks from Aspergillus/Penicillium in all areas of the property against outside.

Sample ID:	504756-01			504756-02			504756-03			504756-04		
Client Sample ID:	Ambient			Loft			Lounge			Bed 1		
Volume Sampled (L):	75			75			75			75		
Media:	Air-O-Cell			Air-O-Cell			Air-O-Cell			Air-O-Cell		
Percent of Trace Analyzed:	100% at 600X Magnification			100% at 600X Magnification			100% at 600X Magnification			100% at 600X Magnification		
Spore Types	**Raw Count**	**Count/m³**	**%**	**Raw Count**	**Count/m³**	**%**	**Raw Count**	**Count/m³**	**%**	**Raw Count**	**Count/m³**	**%**
Alternaria	–	–	–	Observed 1-49		–	–	–	–	–	–	–
Arthrinium	–	–	–	–	–	–	–	–	–	–	–	–
Ascospores	10	133	3	Observed 1-49		–	2	27	6	1	13	6
Aspergillus/Penicillium-Like	3	40	1	Observed 500-999		–	30	400	86	7	93	44
Basidiospores	14	187	4	Observed 1-49		–	1	13	3	4	53	25
Bipolaris/Dreschlera	–	–	–	–	–	–	–	–	–	–	–	–
Botrytis	–	–	–	–	–	–	–	–	–	–	–	–
Chaetomium	–	–	–	–	–	–	–	–	–	–	–	–
Cladosporium	164	2,187	52	Observed 1-49		–	1	13	3	3	40	19
Curvularia	–	–	–	–	–	–	–	–	–	–	–	–
Epicoccum	–	–	–	–	–	–	–	–	–	–	–	–
Fusarium	–	–	–	–	–	–	–	–	–	–	–	–
Ganoderma	3	40	1	–	–	–	–	–	–	–	–	–
Memnoniella	–	–	–	–	–	–	–	–	–	–	–	–
Nigrospora	–	–	–	–	–	–	–	–	–	–	–	–
Oidium/Peronospora	1	13	<1	–	–	–	–	–	–	–	–	–
Pithomyces	–	–	–	–	–	–	–	–	–	–	–	–
Rust	2	27	1	–	–	–	–	–	–	–	–	–
Smut/Myxomyces/Periconia	121	1,613	38	Observed 1-49		–	–	–	–	1	13	6
Stachybotrys	–	–	–	–	–	–	–	–	–	–	–	–
Torula	–	–	–	–	–	–	1	13	3	–	–	–
Ulocladium	–	–	–	–	–	–	–	–	–	–	–	–
Unidentified Spores	–	–	–	–	–	–	–	–	–	–	–	–
Total Spores	**318**	**4,240**		**–**	**–**		**35**	**467**		**16**	**213**	
Hyphal Fragments	3	40		Observed 1-49			1	13		2	27	
Pollen	4	53		–	–		1	13		4	53	
Debris Rating	3			5*			3			4		
Detection Limit	13			13			13			13		

* Enumeration not possible due to excessive debris. Results reported as an observed range in and around the border of the trace.

Sample ID:	504756-05			504756-06		
Client Sample ID:	Bed 2			Bed 3		
Volume Sampled (L):	75			75		
Media:	Air-O-Cell			Air-O-Cell		
Percent of Trace Analyzed:	100% at 600X Magnification			100% at 600X Magnification		
Spore Types	**Raw Count**	**Count/m³**	**%**	**Raw Count**	**Count/m³**	**%**
Alternaria	–	–	–	–	–	–
Arthrinium	–	–	–	–	–	–
Ascospores	–	–	–	–	–	–
Aspergillus/Penicillium-Like	3	40	17	24	320	86
Basidiospores	3	40	17	–	–	–
Bipolaris/Dreschlera	–	–	–	–	–	–
Botrytis	–	–	–	–	–	–
Chaetomium	–	–	–	–	–	–
Cladosporium	11	147	61	3	40	11
Curvularia	–	–	–	–	–	–
Epicoccum	–	–	–	–	–	–
Fusarium	–	–	–	–	–	–
Ganoderma	1	13	6	–	–	–
Memnoniella	–	–	–	–	–	–
Nigrospora	–	–	–	–	–	–
Oidium/Peronospora	–	–	–	–	–	–
Pithomyces	–	–	–	–	–	–
Rust	–	–	–	–	–	–
Smut/Myxomyces/Periconia	–	–	–	1	13	4
Stachybotrys	–	–	–	–	–	–
Torula	–	–	–	–	–	–
Ulocladium	–	–	–	–	–	–
Unidentified Spores	–	–	–	–	–	–
Total Spores	**18**	**240**		**28**	**373**	
Hyphal Fragments	–	–		–	–	
Pollen	4	53		1	13	
Debris Rating	4			3		
Detection Limit	13			13		

* Enumeration not possible due to excessive debris. Results reported as an obser

The following table is subjective only and is drawn by the author to highlight important issues. In this table we could assume the home is far more contaminated than ambient outside air in terms of count and percentage of sample volume. It also appears the loft may be the source.

Penicillium/Aspergillus distribution inside the home against ambient

Area	Ambient	Loft	Lounge	Bed 1	Bed 2	Bed 3
Count	40	500-999	400	93	40	320
Percentage	1		86	44	17	86

Fungal Glossary

 Typically found growing outdoors

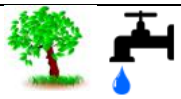
 Considered water damage indicator

 Potential allergen

 Potential to produce mycotoxins

Alternaria	
Description	**Characteristic**
These are a common plant pathogen involved in the decomposition of plants. In the indoor environment they are found growing on a variety of substrates including sheetrock and other building materials. They are common allergens causing hay fever or hypersensitivity reactions.	

Anthrinium	
Description	**Characteristic**
These are a plant pathogen found in soil and decomposing plant material. Not typically found growing indoors. One species has been determined to be an allergen.	

Ascospores	
Description	**Characteristic**
These are a very large group of spores that are found everywhere in nature. They are commonly found outdoors and associated with rain and moisture. Some species grow well indoors on damp materials. Ascospores have allergenic potential, however, it is species dependent.	

Aspergillus/Penicillium – Like	
Description	**Characteristic**
These are two of the most common genera in the world. They can be found everywhere in nature, both indoors and outdoors. Indoors they can be found on water damaged wallpaper, carpet, and other organic materials. They can also grow well in conditions of high humidity. Many species are allergens and a common cause of respiratory irritation. Some species are human and animal pathogens and can cause infection.	

Basidiospores	
Description	**Characteristic**
These are primarily comprised of mushrooms and shelf fungi. They are typically found outdoors. Occasionally they are found indoors growing	

on any organic matter causing dry rot. Some species can be an allergen to sensitive individuals.	

Bipolaris/Dreschlera	
Description	**Characteristic**
These are a plant pathogen typically found outdoors on grasses, grains, and decaying food. Indoors they can be found on plants and building materials. They are an allergen that can affect the nose, skin, eyes and upper respiratory track.	

Botrylis	
Description	**Characteristic**
These are a plant pathogen typically found growing on vegetation particularly in temperate and subtropical climates. Indoors they can be found growing on plants. They are a potential allergen causing hay fever and asthma effects.	

Chaetomium	
Description	**Characteristic**
These are typically found indoors on water damaged cellulose containing materials such as paper, sheetrock, and wallpaper. Not well studied but possible allergen with hay fever and asthma effects.	

Cladosporium	
Description	**Characteristic**
One of the most common genera in both the indoor and outdoor environments. Indoors they grow well in damp environments and areas where condensation builds. They are often found on textiles, window sills, in bathrooms, and A/C systems. They are a common allergen when airborne.	

Curvularia	
Description	**Characteristic**
Primarily found outdoors on plants and soil especially in subtropical and tropical environments. Indoors they grow on a variety of building materials. They are a common allergen causing hay fever, asthma, and allergic fungal sinusitis.	

Epicoccum	
Description	**Characteristic**
Outdoors they are found in the soil, air, and rotting vegetation. Indoors they grow well on a variety of building materials such as paper and textiles. They are a potential allergen with hay fever, asthma, and skin allergy effects.	

Fusarium	
Description	**Characteristic**
Indoors they are typically found under very wet conditions. Some places they can be found are dust in carpet and mattresses, damp walls, wallpaper, and duct liner. They are a potential allergen causing hay fever and asthma effects.	

Ganoderma	
Description	**Characteristic**
These are shelf mushrooms that are typically found growing outdoors on wood causing white rot, root rot, and stem rot. They are a possible allergen at high concentration	

Memnoniella	
Description	**Characteristic**
These are mycotoxin producing spores related to and often found in conjunction with Stachybotrys. These grow well on water damaged cellulose containing building materials such as sheetrock, paper, wallpaper, and textiles.	

Description	**Characteristic**
These are typically found on decaying plant material and soil and are usually not found growing indoors. They are a potential allergen causing hay fever and asthma effects.	

Oidium/Peronospora	
Description	**Characteristic**
These are plant pathogens that are common obligate parasites on leaves, stems, flowers, and fruits of higher living plants.	

Pithomyces	
Description	**Characteristic**
These are typically found on dead leaves and stems of plants. Rarely found growing indoors; however, they grow well on paper indoors given the right conditions.	

Rust	
Description	**Characteristic**
These are parasitic plant pathogens that grow on plants, grass, and trees. They are rarely found growing indoors since they require a living host, and therefore typically not found on cellulose containing building materials. They are a potential allergen causing hay fever and asthma effects.	
Smut/Myxomyces/Periconia	

Description	Characteristic
This is a grouping of several genera organized together in a general category that are mostly associated with living and decaying plants, wood, soil, grass, cereal crops, weeds, and flowering plants. These are rarely found growing indoors. They are a potential allergen causing hay fever and asthma effects.	

Strachybotrys	
Description	**Characteristic**
These are typically found indoors growing on water damaged cellulose containing building materials such as sheetrock, paper, and ceiling tiles. They are often referred to as "toxic black mold." They have the ability to produce mycotoxins which may cause a burning sensation in the mouth, throat, and nasal passages. Chronic exposure has been known to cause headaches, diarrhoea, memory loss, and brain damage.	

Torula	
Description	**Characteristic**
These are typically found growing outdoors on leaves, roots, wood, and soil. Indoors they can be found growing on water damaged cellulose, paper, wicker, straw baskets and ceiling tiles. They are a potential allergen causing hay fever and asthma effects.	

Ulocladium	
Description	**Characteristic**
Requires very wet conditions and can commonly be found indoors in damp or wet areas such as bathrooms, kitchens, basements, and around windows. These grow well on cellulose containing materials such as paper and straw and on water damaged building material such as sheetrock. They are a common allergen causing hay fever and asthma effects.	

Unidentified Spores	
Description	**Characteristic**
This is a grouping of spores that are unable to be categorized due to a variety of reasons. They may be weathered, disfigured, or otherwise lacking the morphological structures necessary to identify the genus.	

Hyphal Fragments	
Description	**Characteristic**
These are branched filamentous structures with cell walls. Hyphae are somewhat analogous to stems or roots in plants whereas the spores would be analogous to the seeds. Large quantities present may indicate an active fungal colony or active fungal growth in the structure	

Pollen	
Description	**Characteristic**
These are a fine to course powdery substance produced by the anthers of seed-bearing plants, trees, grasses, flowers, and weeds. They are an allergen that causes hay fever effects.	

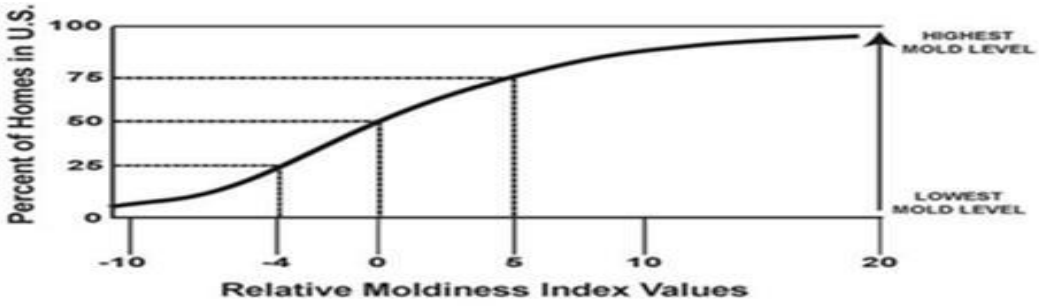
18. PCR-DNA dust sampling

The ERMI score can be used to measure distribution of potentially toxigenic and naturally occurring environmental mould species. This assessment can only be utilised when several samples from differing areas are taken and analysed for comparison.

The risk score is derived from the presence of Group 1 moulds which likely to produce mycotoxins and are known as potentially toxigenic

These moulds are usually below detection levels in ambient air and are considered markers of water damage and possible health hazards.

The “Environmental Relative Mold Index” table below, (ERMI) shows the typical results from 1096 homes analysed by the Environmental Protection Agency.



The EPA developers of ERMI categorically state its use is for professional research use only and no significance as to risk or hazard can be gained from scores

It should be noted different states and time of year can influence results.

An ERMI score of 0 would represent the average level of mould contamination (50%) of homes investigated. It should be pointed out here that a minus score does not mean there is not a health hazard present or indeed low risk. We have assessed the species particularly in the group one section.

Below we have included the risk table for those that may require information on ERMI score

Level	ERMI Values	Interpretation	Comment
Q 1	Less than - 4	Low Relative Moldiness Index	Further investigation is not needed to determine the sources of the mold.
Q 2	-4 to < 0	Low - Medium Relative	Further investigation may be needed to determine the sources of the mold if occupants have been reactive, sensitized, genetically predisposed or otherwise immuno-compromised.
Q 3	0 to < 5	Medium- High Relative	
Q 4	5 to < 20	High Relative Moldiness Index	Source and cause of mold should be determined and remediation is undertaken, reducing the ERMI to levels below Q2.
	> 20	Very High Relative	

Significant Results
The following table shows almost all water damage indicator species of mould present in these five samples

The spread of these potentially toxigenic species is homogenous throughout the property with all areas affected.

Only Asterix counts have been highlighted but all species in the list are present
The red highlighted species are present at elevated in all areas tested and indicate homogenous spread.

Area	Main bed	Buddies	Loft	Dan Bed	Lounge
Species					
Aspergillus flavus		*			
Aspergillus fumigatus	*	*	*	*	
Aspergillus niger	*	*		*	
Aspergillus restrictus		**	***	**	*
Aspergillus versicolor	*	**	**	**	**
Aureobasidium pollulans	*	*		*	
Cladosporium sphaerospermum			*		
Eurotium	*	*	*	*	*
Paecilomyces variotii	*	*	*	*	*
Penicillium Brevicompactum	**	**	***	**	**
Penicillium corylophium	**	**	***	**	**
Penicillium crustosum	**	**	*	**	**
Penicillium purpogeum	*	*		*	*
Penicillium Spinoulosum		**		**	
Stachybotrys	*	**	**	*	*
Trichoderma	*	*		*	*
Wallemia					

***10 fold normal **100 fold normal ***1000 fold normal**

Main bedroom

Group 1: Water Damage Molds		
Species	**Level**	**SE/mg**
Aspergillus flavus/oryzae		5
Aspergillus fumigatus		22 *
Aspergillus niger		207 *
Aspergillus ochraceus		N.D
Aspergillus penicillioides		292
Aspergillus restrictus		516 *
Aspergillus sclerotiorum		N.D
Aspergillus sydowii		N.D
Aspergillus unguis		N.D
Aspergillus versicolor		860 *
Aureobasidium pullulans		4,048 *
Chaetomium globosum		N.D
Cladosporium sphaerospermum		74
Eurotium (Asp.) amstelodami		4,263 *
Paecilomyces variotii		32 *
Penicillium brevicompactum		1,555 * *
Penicillium corylophilum		586 * *
Penicillium crustosum		651 * *
Penicillium purpurogenum		25 *
Penicillium Spinulosum		90 *
Penicillium variabile		23
Scopulariopsis brevicaulis/fusca		6
Scopulariopsis chartarum		23
Stachybotrys chartarum		45 *
Trichoderma viride		54 *
Wallemia sebi		660
Sum of logs G1		44.9

Group 2: Common Indoor Molds		
Species	**Level**	**SE/mg**
Acremonium strictum		37
Alternaria alternata		8
Aspergillus ustus		N.D
Cladosporium cladosporioides1		4,648
Cladosporium cladosporioides2		234 *
Cladosporium herbarum		428
Epicoccum nigrum		498
Mucor amphibiorum		555 *
Penicillium chrysogenum		2,466 * *
Rhizopus stolonifer		25 *
Sample Size	Sum of logs G2	21.4
5.0	**Ermi Results = (G1-G2)**	23.5

SE = Spore Equivalents
SE/mg = SE/milligrams of sample
Logs = Logarithms
ND = None Detected

(*) Normal
(**) 10 fold higher than normal.
(***) 100 fold higher than normal.
1,000 fold higher than normal.

Son 1' bedroom

Group 1: Water Damage Molds		
Species	**Level**	**SE/mg**
Aspergillus flavus/oryzae		10 *
Aspergillus fumigatus		47 *
Aspergillus niger		278 *
Aspergillus ochraceus		N.D
Aspergillus penicillioides		658
Aspergillus restrictus		1,324 * *
Aspergillus sclerotiorum		N.D
Aspergillus sydowii		29
Aspergillus unguis		2
Aspergillus versicolor		1,884 * *
Aureobasidium pullulans		5,641 *
Chaetomium globosum		18
Cladosporium sphaerospermum		120
Eurotium (Asp.) amstelodami		6,803 *
Paecilomyces variotii		55 *
Penicillium brevicompactum		3,351 * *
Penicillium corylophilum		2,361 * *
Penicillium crustosum		1,131 * *
Penicillium purpurogenum		32 *
Penicillium Spinulosum		178 * *
Penicillium variabile		25
Scopulariopsis brevicaulis/fusca		14
Scopulariopsis chartarum		23
Stachybotrys chartarum		629 * *
Trichoderma viride		161 *
Wallemia sebi		1,122
Sum of logs G1		54.5

Group 2: Common Indoor Molds		
Species	**Level**	**SE/mg**
Acremonium strictum		37
Alternaria alternata		8
Aspergillus ustus		N D
Cladosporium cladosporioides1		4,648
Cladosporium cladosporioides2		234 *
Cladosporium herbarum		428
Epicoccum nigrum		498
Mucor amphibiorum		555 *
Penicillium chrysogenum		2,466 * *
Rhizopus stolonifer		25 *
Sample Size	Sum of logs G2	21.4
5.0	**Ermi Results = (G1-G2)**	23.5

SE = Spore Equivalents
SE/mg = SE/milligrams of sample
Logs = Logarithms
ND = None Detected

(*) Normal
(**) 10 fold higher than normal.
(***) 100 fold higher than normal.
1,000 fold higher than normal.

Loft

Group 1: Water Damage Molds			
Species	**Level**	**SE/mg**	
Aspergillus flavus/oryzae		2	
Aspergillus fumigatus		24	*
Aspergillus niger		8	
Aspergillus ochraceus		N.D	
Aspergillus penicillioides		1,056	
Aspergillus restrictus		7,917	* * *
Aspergillus sclerotiorum		N.D	
Aspergillus sydowii		N.D	
Aspergillus unguis		N.D	
Aspergillus versicolor		1,773	* *
Aureobasidium pullulans		673	
Chaetomium globosum		6	
Cladosporium sphaerospermum		2,614	*
Eurotium (Asp.) amstelodami		2,570	*
Paecilomyces variotii		30	*
Penicillium brevicompactum		19,042	* * *
Penicillium corylophilum		24,267	* * *
Penicillium crustosum		265	*
Penicillium purpurogenum		2	
Penicillium Spinulosum		18	*
Penicillium variabile		26	
Scopulariopsis brevicaulis/fusca		4	
Scopulariopsis chartarum		6	
Stachybotrys chartarum		271	* *
Trichoderma viride		8	
Wallemia sebi		298	
Sum of logs G1		45.9	

Group 2: Common Indoor Molds		
Species	**Level**	**SE/mg**
Acremonium strictum		37
Alternaria alternata		3
Aspergillus ustus		N.D
Cladosporium cladosporioides1		7,189
Cladosporium cladosporioides2		6,792 **
Cladosporium herbarum		734
Epicoccum nigrum		148
Mucor amphibiorum		71
Penicillium chrysogenum		5,635 **
Rhizopus stolonifer		N.D
Sample Size	Sum of logs G2	20.3
5.0	**Ermi Results = (G1-G2)**	25.6

SE = Spore Equivalents
SE/mg = SE/miligrams of sample
Logs = Logarithms
ND = None Detected

(*) Normal
(**) 10 fold higher than normal.
(***) 100 fold higher than normal.
1,000 fold higher than normal.

Son 2 Bedroom

Group 1: Water Damage Molds		
Species	**Level**	**SE/mg**
Aspergillus flavus/oryzae		7
Aspergillus fumigatus		68 *
Aspergillus niger		294 *
Aspergillus ochraceus		N.D
Aspergillus penicillioides		613
Aspergillus restrictus		4,680 **
Aspergillus sclerotiorum		N.D
Aspergillus sydowii		35
Aspergillus unguis		3
Aspergillus versicolor		1,651 **
Aureobasidium pullulans		6,490 *
Chaetomium globosum		21
Cladosporium sphaerospermum		98
Eurotium (Asp.) amstelodami		5,026 *
Paecilomyces variotii		67 *
Penicillium brevicompactum		2,648 **
Penicillium corylophilum		1,192 **
Penicillium crustosum		935 **
Penicillium purpurogenum		18 *
Penicillium Spinulosum		149 **
Penicillium variabile		26
Scopulariopsis brevicaulis/fusca		15
Scopulariopsis chartarum		41 *
Stachybotrys chartarum		70 *
Trichoderma viride		293 *
Wallemia sebi		903
Sum of logs G1		53.8

Group 2: Common Indoor Molds		
Species	**Level**	**SE/mg**
Acremonium strictum		88 *
Alternaria alternata		15
Aspergillus ustus		N.D
Cladosporium cladosporioides1		7,504
Cladosporium cladosporioides2		293 *
Cladosporium herbarum		842
Epicoccum nigrum		954 *
Mucor amphibiorum		653 *
Penicillium chrysogenum		3,193 * *
Rhizopus stolonifer		10
Sample Size	Sum of logs G2	22.7
5.1	**Ermi Results = (G1-G2)**	31.1

SE = Spore Equivalents
SE/mg = SE/milligrams of sample
Logs = Logarithms
ND = None Detected

(*) Normal
(**) 10 fold higher than normal.
(***) 100 fold higher than normal.
1,000 fold higher than normal.

Lounge

Group 1: Water Damage Molds		
Species	**Level**	**SE/mg**
Aspergillus flavus/oryzae		7
Aspergillus fumigatus		19
Aspergillus niger		137
Aspergillus ochraceus		2
Aspergillus penicillioides		1,338
Aspergillus restrictus		366 *
Aspergillus sclerotiorum		N.D
Aspergillus sydowii		219 *
Aspergillus unguis		12 *
Aspergillus versicolor		3,642 * *
Aureobasidium pullulans		1,728
Chaetomium globosum		17
Cladosporium sphaerospermum		52
Eurotium (Asp.) amstelodami		3,592 *
Paecilomyces variotii		164 *
Penicillium brevicompactum		2,213 * *
Penicillium corylophilum		1,175 * *
Penicillium crustosum		673 * *
Penicillium purpurogenum		17 *
Penicillium Spinulosum		47 *
Penicillium variabile		23
Scopulariopsis brevicaulis/fusca		4
Scopulariopsis chartarum		15
Stachybotrys chartarum		31 *
Trichoderma viride		50 *
Wallemia sebi		1,020
Sum of logs G1		50.8

Group 2: Common Indoor Molds		
Species	**Level**	**SE/mg**
Acremonium strictum		27
Alternaria alternata		9
Aspergillus ustus		N.D
Cladosporium cladosporioides1		1,940
Cladosporium cladosporioides2		77
Cladosporium herbarum		157
Epicoccum nigrum		308
Mucor amphibiorum		243 *
Penicillium chrysogenum		7,551 **
Rhizopus stolonifer		16
Sample Size	Sum of logs G2	19.7
5.1	**Ermi Results = (G1-G2)**	31.0

SE = Spore Equivalents
SE/mg = SE/miligrams of sample
Logs = Logarithms
ND = None Detected

(*) Normal
(**) 10 fold higher than normal.
(***) 100 fold higher than normal.
1,000 fold higher than normal.

HERTSMI 2

This is a risk assessment of hazards identified in the QPCR-DNA sample analysis. Put into simple terms, this calculation is based on thousands of patients with varying exposures and their personal response to medication s recorded by their practitioners. The higher the HERTSMI 2 score is, the less likely the CIRS patient is to respond to treatment while those contaminates remain at elevated levels.

The following table shows counts greater than 15 CIRS patients or those diagnosed with mould illness are unlikely to respond to treatment while in the property.

Color-coded interpretation [10]	
If 10 or below	In only 1.7% of cases, re-occupancy of building following mold remediation has led to relapse of CIRS-WDB symptoms
If between 11 to 15	Borderline. Further remediation and re-assessment is indicated
If greater than 15	Re-occupancy is ill-advised until further remediation and re-assessment are conclusive.

Mian bedroom

HERTSMI-2 Species	Spore E./mg	Weighting
Aspergillus penicillioides	292	6
Aspergillus versicolor	860	10 *
Chaetomium globosum	N.D	0
Stachybotrys chartarum	45	6 *
Wallemia sebi	660	6
Sample Size 5.0 mg	HERTSMI-2 Score =	28

Buddies room

HERTSMI-2 Species	Spore E./mg	Weighting	
Aspergillus penicillioides	658	10	
Aspergillus versicolor	1,884	10	* *
Chaetomium globosum	18	4	
Stachybotrys chartarum	629	10	* *
Wallemia sebi	1,122	6	
Sample Size	5.0 mg	HERTSMI-2 Score =	40

Loft

HERTSMI-2 Species	Spore E./mg	Weighting	
Aspergillus penicillioides	1,056	10	
Aspergillus versicolor	1,773	10	* *
Chaetomium globosum	6	4	
Stachybotrys chartarum	271	10	* *
Wallemia sebi	298	4	
Sample Size	5.0 mg	HERTSMI-2 Score =	38

Son 1 Bedroom

HERTSMI-2 Species	Spore E./mg	Weighting	
Aspergillus penicillioides	613	10	
Aspergillus versicolor	1,651	10	* *
Chaetomium globosum	21	4	
Stachybotrys chartarum	70	6	*
Wallemia sebi	903	6	
Sample Size	5.1 mg	HERTSMI-2 Score =	36

Lounge

HERTSMI-2 Species		Spore E./mg	Weighting	
Aspergillus penicillioides		1,338	10	
Aspergillus versicolor		3,642	10	* *
Chaetomium globosum		17	4	
Stachybotrys chartarum		31	6	*
Wallemia sebi		1,020	6	
Sample Size	5.1 mg	HERTSMI-2 Score =	36	

Genetically close –related species may be detected in the indicator assay

As reported	Includes
Eurotium (Asp.) amstelodami	E. chevalieri, E. herbariorum, E. rubrum and E. repens.
Penicillium spinulosum	P. glabrum, P. lividum, P. pupurescens, and P. thomii.
Trichoderma viride	T. koningii and T. atroviride.
Aspergillus restrictus	A. caesillus and A. conicus.
Mucor amphibiorum	M. circinelloides, M. hiemalis, M. indicus, M. mucedo, M. racemosus, M. ramosissimus.
Rhizopus zygosporus	R. homothalicus, R. microsporus, R. oligosporus, R. oryzae.
Penicillium crustosum	P. camembertii, P. commune, P. echinulatum, P. solitum.
Aspergillus niger	Know called Aspergillus basiliensis
Scopulariopsis brevicaulis/fusca	Has been renamed as species of Microascus[10]
Wallemia sebi	W. mellicola, W. canadensis[11]

19. Endotoxin

Endotoxins are Gram negative bacteria and can have serious health consequence when amplified.

<u>These results show levels are normal</u>

Reference Number	Locations	Result EU/mg	Q Level
410781-1	Main Bed	99	Q 2

Color-coded interpretation	
If 100 or below	Recommended for CIRS.
If 200 or below	Recommended for No CIRS.
If greater than 200	Remediation is needed.

20 Actinomycetes Main bedroom only
The following table and scores are used to assess vulnerability of CIRS patients. The family have not been tested or diagnosed for CIRS

Actino Score	17
Pathogen Score (Q Level)	Q4
Black Water Score (Q Level)	Q1

Actino Score interpretation (Water Damage)	
20 or below	Indicative of a Healthy Building
Between 21 to 23	Further investigation needed
Greater than 24	Suggestive of Building Related Illness.

	Total Species	Pathogen Species	Be/mg Total	Q Level
Bacteria	1,803	210	21,712,104	**Q 4**
Actino	440	58		

Summary of Bacteria's Order

Orders Detected	Abundance B.E/mg	Families	Abundance	Fold ▲	Diversity	Fold ▲	Pathogen
Actinomycetales	4,992,235	35	46 %	1.9	16.4 %	0.9	58
Bacillales	1,823,801	14	17 %	1.3	6.5 %	1.0	22
Pseudomonadales	928,186	2	9 %	8.4	0.9 %	0.7	12
Clostridiales	764,470	18	7 %	2.3	8.4 %	1.0	26
Lactobacillales	386,039	6	4 %	2.8	2.8 %	1.1	20
Enterobacteriales	325,679	1	3 %	8.8	0.5 %	0.6	14
Burkholderiales	125,492	6	1 %	0.9	2.8 %	1.1	5
Rhizobiales	103,776	13	1 %	0.4	6.1 %	1.3	1
Rhodospirillales	103,130	3	1 %	0.2	1.4 %	0.8	0
Rhodobacterales	102,694	1	1 %	0.4	0.5 %	0.7	0

▲ = Fold over normal top orders

Table only list 10

Q1 Quartile **Q2 Quartile** **Q3 Quartile** **Q4 Quartile**

B.E = Bacteria Equivalents
B.E/mg = B.E/miligrams of sample
Logs = Logarithms
ND = None Detected

(* *) 100 fold higher than normal.
(* * *) 1,000 fold higher than normal.

P = Human Pathogen

Normal values are based on bacteria distribution in 1,000 US homes.
Distribution of bacteria species are also ranked on Quadriles, only elevated species are highlighted with a color code for Q3 and Q4.

Actino Species Detected

	Genus & Species	B.E/mg	Comments	Q Level
1	Actinomyces graevenitzii	217 P		
2	Actinomyces hongkongensis	434 P		
3	Actinomyces massiliensis	1,086		
4	Actinomyces naeslundii	3,474 P		
5	Actinomyces odontolyticus	10,856 P	*	
6	Actinomyces viscosus	651 P		
18	Corynebacterium amycolatum	42,339 P		
19	Corynebacterium appendicis	61,011	* *	
20	Corynebacterium aquatimens	1,954		
21	Corynebacterium aquilae	1,086		
22	Corynebacterium aurimucosum	29,094	*	
23	Corynebacterium capitovis	2,605		
24	Corynebacterium coyleae	3,691 P		

25	Corynebacterium durum	6,297				
26	Corynebacterium frankenforstense	5,862		*		
27	Corynebacterium glycinophilum	651				
28	Corynebacterium ihumii	23,232		*		
29	Corynebacterium imitans	122,891	P			
30	Corynebacterium jeddahense	1,954				
31	Corynebacterium jeikeium	293,331	P	*	*	
32	Corynebacterium kroppenstedtii	5,862	P			
33	Corynebacterium lactis	2,823				
34	Corynebacterium macginleyi	217	P			
35	Corynebacterium pilbarense	70,564		*		
36	Corynebacterium pilosum	217				
37	Corynebacterium simulans	10,205	P	*		
38	Corynebacterium singulare	191,284		*		
39	Corynebacterium sputi	217				
40	Corynebacterium suicordis	32,134	P	*		
41	Corynebacterium sundsvallense	3,691	P			
42	Corynebacterium tapiri	1,520				
43	Corynebacterium thomssenii	9,336	P			
44	Corynebacterium tuberculostearicum	649,626	P	*		
45	Corynebacterium ureicelerivorans	39,299	P	*		
46	Corynebacterium uterequi	434				
63	Mycobacterium aichiense	434	P			
64	Mycobacterium chitae	434				
65	Mycobacterium cookii	217				
66	Mycobacterium duvalii	434				
67	Mycobacterium hodleri	1,086				
68	Mycobacterium holsaticum	217				
69	Mycobacterium madagascariense	1,520				
70	Mycobacterium monacense	1,303	P			
71	Mycobacterium moriokaense	1,303				
72	Mycobacterium paragordonae	651				
73	Mycobacterium rhodesiae	651				
74	Mycobacterium sediminis	217				
75	Mycobacterium sphagni	1,086				
80	Propionibacterium acidipropionici	217				

81	Propionibacterium acnes	33,220	P		
85	Streptomyces polyrhachis	217			

Other Elevated Species Detected

	Genus & Species	B.E/mg	Comments		Q Level
1	Abiotrophia defectiva	24,318	P	*	
2	Acetivibrio cellulolyticus	651			
3	Acinetobacter johnsonii	57,971	P	*	
4	Acinetobacter lwoffii	77,729	P	*	
5	Acinetobacter tjernbergiae	14,113		*	
6	Alloprevotella rava	7,165		*	
7	Alloscardovia omnicolens	6,297		*	
8	Anaerococcus nagyae	70,781		*	
9	Anaerococcus octavius	76,427		*	
10	Anaerococcus provenciensis	80,118		*	
11	Anaerococcus senegalensis	12,810		*	
12	Anaerococcus vaginalis	9,119	P		
13	Bacillus nealsonii	9,336		*	
14	Bifidobacterium adolescentis	13,462		*	
15	Blautia faecis	4,777			
16	Blautia luti	6,514			
17	Blautia obeum	9,119		*	
18	Blautia wexlerae	9,553		*	
19	Brevibacterium paucivorans	61,445	P	*	*
20	Brevundimonas halotolerans	25,403		*	
21	Catabacter hongkongensis	1,303			
22	Chryseobacterium anthropi	8,902		*	
23	Collinsella aerofaciens	12,593	P	*	
24	Corynebacterium accolens	7,382	P	*	
25	Corynebacterium ammoniagenes	18,238		*	
26	Corynebacterium atypicum	2,171		*	
27	Corynebacterium auriscanis	4,342	P	*	
28	Corynebacterium camporealensis	8,251	P	*	
29	Corynebacterium casei	15,633		*	
30	Corynebacterium flavescens	4,560		*	

31	Corynebacterium glucuronolyticum	13,244	P	*		
32	Corynebacterium massiliense	46,247		*	*	
33	Corynebacterium striatum	4,994	P	*		
34	Corynebacterium timonense	12,810		*		
35	Dermabacter hominis	31,700		*		
36	Dermacoccus abyssi	122,239		*	*	
37	Dermacoccus nishinomiyaensis	276,178		*	*	
38	Dialister invisus	4,560	P	*		
39	Dorea longicatena	3,040				
40	Eremococcus coleocola	24,752		*		
41	Erwinia billingiae	9,119		*		
42	Eubacterium coprostanoligenes	1,520				
43	Ezakiella peruensis	18,455		*		
44	Facklamia languida	56,669		*		
45	Facklamia tabacinasalis	4,777		*		
46	Finegoldia magna	134,615	P	*	*	
47	Fusicatenibacter saccharivorans	3,691				
48	Fusobacterium periodonticum	4,560	P	*		
49	Gemella haemolysans	29,528	P	*		
50	Gemella sanguinis	6,297	P	*		
51	Gemmiger formicilis	11,290		*		
52	Gracilibacter thermotolerans	434				
53	Granulicatella adiacens	19,758	P	*		
54	Granulicatella elegans	12,376	P	*		
55	Haemophilus parainfluenzae	12,810	P	*		
56	Hydrogenispora ethanolica	2,171				
57	Hyphomicrobium vulgare	6,731		*		
58	Ignavigranum ruoffiae	5,645	P	*		
59	Kocuria marina	357,815		*	*	
60	Kocuria palustris	552,790		*	*	
61	Kocuria rhizophila	472,673		*	*	
62	Kytococcus schroeteri	92,928		*	*	
63	Lactobacillus gasseri	19,324		*		
64	Leptotrichia buccalis	4,994		*		
65	Leptotrichia shahii	4,994		*		
66	Microbacterium lacticum	3,040		*		

67	Negativicoccus succinicivorans	4,994		*		
68	Neisseria perflava	21,495		*		
69	Neisseria subflava	3,474	P	*		
70	Pantoea agglomerans	3,257	P			
71	Pantoea conspicua	46,247		*		
72	Pantoea deleyi	23,883		*		
73	Pantoea dispersa	118,114		*		
74	Pantoea septica	13,896				
75	Pantoea vagans	86,848		*		
76	Paracoccus stylophorae	12,159		*		
77	Pelotomaculum schinkii	217				
78	Peptoniphilus coxii	28,443		*		
79	Peptoniphilus grossensis	22,798		*		
80	Peptoniphilus harei	10,422	P	*		
81	Peptoniphilus lacrimalis	9,770	P	*		
82	Peptoniphilus obesi	14,764		*		
83	Peptostreptococcus anaerobius	4,342	P	*		
84	Porphyromonas bennonis	28,660		*		
85	Porphyromonas pasteri	10,422		*		
86	Prevotella buccalis	5,862	P	*		
87	Prevotella copri	4,560		*		
88	Prevotella timonensis	4,125		*		
89	Psychrobacter alimentarius	2,605		*		
90	Psychrobacter sanguinis	714,328		*	*	
91	Roseomonas aquatica	9,770		*		
92	Rothia dentocariosa	6,079		*		
93	Rothia endophytica	18,455		*		
94	Rothia mucilaginosa	15,633	P	*		
95	Rubellimicrobium mesophilum	16,935		*		
96	Siccibacter turicensis	434				
97	Staphylococcus arlettae	9,770		*		
98	Staphylococcus chromogenes	5,645	P	*		
99	Staphylococcus cohnii	91,191	P	*	*	
100	Staphylococcus cohnii	41,036	P	*		
101	Staphylococcus devriesei	151,768		*	*	
102	Staphylococcus haemolyticus	84,460	P	*	*	

103	Staphylococcus hominis	579,279	P	*	
104	Staphylococcus pasteuri	4,125	P	*	
105	Staphylococcus pettenkoferi	233,622		*	*
106	Staphylococcus saprophyticus	260,979	P	*	*
107	Staphylococcus saprophyticus	14,113	P	*	
108	Streptobacillus notomytis	5,211		*	
109	Streptococcus dysgalactiae	17,153	P	*	
110	Streptococcus gordonii	8,685		*	
111	Streptococcus peroris	4,342		*	
112	Streptococcus salivarius	59,925	P	*	
113	Streptococcus salivarius	41,253	P	*	
114	Streptococcus sanguinis	39,950	P	*	
115	unidentified bacterium	1,303		*	
116	unidentified bacterium	1,303		*	
117	unidentified bacterium	1,086		*	

Cyanobacteria Species Detected

	Genus & Species	B.E/mg	Comments	Q Level	
1	Aerosakkonema funiforme	217			
2	Anabaena flosUnclassifiedaquae	1,303			Microcystin
3	Anabaena sp	5,211			Anatoxin-a, Microcystin
4	Aphanizomenon flosUnclassifiedaquae	17,804			Cylindrospermopsins, Saxitoxin
5	Arthrospira sp	1,520			
6	Brasilonema bromeliae	25,403			
7	Brasilonema terrestre	17,153	*		
8	Calochaete cimrmanii	217			
9	Calothrix desertica	3,474			
10	Calothrix elsteri	3,257			
11	Chamaesiphon minutus	217			
12	Chroococcidiopsis thermalis	7,165			
13	Crinalium epipsammum	434			
14	Cyanospira rippkae	651			
15	Cylindrospermum siamensis	1,086			
16	Cylindrospermum stagnale	2,823			
17	Fischerella thermalis	1,086			

18	Gloeothece membranacea	1,737			
19	Halomicronema excentricum	217			
20	Halospirulina tapeticola	217			
21	Halothece sp	217			
22	Hassallia andreassenii	2,171			
23	Hassallia antarctica	9,553			
24	Kastovskya adunca	651			
25	Leptolyngbya foveolarum	217			
26	Limnoraphis robusta	217			
27	Loriellopsis cavernicola	1,303			
28	Lyngbya aestuarii	651			
29	Myxosarcina sp	15,198	*		
30	Nostoc sp	10,639			Microcystin, Nodularin
31	Nostoc sp	434			Microcystin, Nodularin
32	Oscillatoria neglecta	434			
33	Oxynema thaianum	1,303			
34	Planktothrix agardhii	1,086			Microcystin
35	Pleurocapsa sp	14,113	*		
36	Rivularia sp	651			
37	Scytonema hofmanni	217			
38	Spirulina sp	217			Microcystin
39	Spirulina subsalsa	217			
40	Synechococcus elongatus	217			
41	Synechococcus sp	5,862	*		Microcystin
42	Trichocoleus desertorum	651			
43	Tychonema bourrellyi	5,862	*		
44	unidentified bacterium	217			

The Cyanobacteria listed above are gram positive bacteria and exposure can result in of serious health consequences. These results should be reviewed by medical specialists in toxicology and infection control. I recommended Baby has skin swabs taken to assess her skin condition against these findings. For the information of your doctors these results were from one swab taken from dust within Babys bedroom and were analysed using NGS. Considering the homogenous nature of other contamination spread, I would consider the presence of these Cyanobacteria to be throughout the property.

Please note I am providing data, and it is for the medical profession to assess these results , symptoms and risk. I have attached the following excerpts form a Peer reviewed paper on Cyanobacteria purely to alert you to possible risks and hazards present.

The following table shows associated health effects from cyanobacteria that can produce the toxins identified

Cyanotoxin	Health Effects[1]	Examples of cyanobacteria capable of producing this toxin[1,2,3]
Microcystins	Carcinogen, hepatotoxin, protein phosphatase inhibition	*Anabaena, Microcystis, Dolichospermum, Planktothrix, Aphanocapsa, Hapalosiphon, Nostoc, Oscillatoria, Anabaenopsis, Arthrospira, Woronichinia, Fischerella, Gloeotrichia, Phormidium, Pseudoanabaena, Synechococcus, Geitlerinema, Microcoleus, Raphidiopsis, Scytonema, Tychonema*
Anatoxins	Respiratory paralysis	*Anabaena, Dolichospermum, Aphanizomenon, Arthrospira, Cylindrospermum, Microcystis, Oscillatoria, Phormidium, Planktothrix, Raphidiopsis, Cuspidothrix, Tychonema, Woronichinia, Geitlerinema, Lyngbya, Microcoleus*
Cylindrospermopsin	Carcinogen, hepatotoxin, protein phosphatase inhibition	*Anabaena, Dolichospermum, Aphanizomenon, Raphidiopsis, Chrysosporum, Cylindrospermopsis, Umezakia, Lyngbya, Microseira, Oscillatoria*
Saxitoxins	Respiratory paralysis, death	*Anabaena, Dolichospermum, Aphanizomenon, Raphidiopsis, Cylindrospermopsis, Lyngbya, Planktothrix, Oscillatoria, Cuspidothrix, Microseira*
Nodularins	Carcinogen, hepatotoxin, protein phosphatase inhibition	*Nodularia, Nostoc*

ACTINO INDEX

Human Habitat (HH)

Species	B.E/mg		
Actinomadura chibensis	434	P	*
Actinomyces canis	1,086	P	*
Actinomyces europaeus	ND		
Actinomyces meyeri	ND		
Actinomyces neuii	ND		
Actinomyces odontolyticus	10,856	P	**
Actinomyces turicensis	434	P	*
Corynebacterium accolens	7,382	P	**
Corynebacterium amycolatum	42,339	P	**
Corynebacterium argentoratense	ND		
Corynebacterium coyleae	3,691	P	**
Corynebacterium falsenii	1,520	P	
Corynebacterium glucuronolyticum	13,244	P	**
Corynebacterium hansenii	ND		
Corynebacterium imitans	122,891	P	**
Corynebacterium jeikeium	293,331	P	***
Corynebacterium kroppenstedtii	5,862	P	
Corynebacterium matruchotii	651	P	*
Corynebacterium minutissimum	ND		
Corynebacterium propinquum	1,520	P	
Corynebacterium resistens	1,954	P	**
Corynebacterium riegelii	217	P	*
Corynebacterium simulans	10,205	P	**
Corynebacterium striatum	4,994	P	**
Corynebacterium sundsvallense	3,691	P	*
Corynebacterium tuberculostearicum	649,626	P	**
Corynebacterium ureicelerivorans	39,299	P	**
Corynebacterium xerosis	ND		
Dermatophilus congolensis	434	P	*
Propionibacterium acnes	33,220	P	*
Propionibacterium avidum	ND		
Propionibacterium granulosum	ND		
Rothia mucilaginosa	15,633	P	**

Soil Habitat (SH)

Species	B.E/mg		
Arthrobacter creatinolyticus	ND		
Arthrobacter crystallopoietes	651	P	
Brevibacterium mcbrellneri	1,954	P	**
Brevibacterium paucivorans	61,445	P	***
Clavibacter michiganensis	ND		
Curtobacterium flaccumfaciens	1,303	P	*
Gordonia terrae	ND		
Nocardia higoensis	ND		
Rathayibacter tritici	ND		
Rhodococcus equi	ND		
Rhodococcus fascians	ND		
Saccharopolyspora rectivirgula	217	P	
Sanguibacter suarezii	217	P	

B.E = Bacteria Equivalents
BE/mg = BE/milligrams of sample
ND = None Detected
P = Human Pathogen

(*) 5 fold higher than normal.
(**) 50 fold higher than normal.
(***) 500 fold higher than normal.

Normal values is based on bacteria distribution on 1,000 US homes.

Dominance Index (DI)	**1.6**
Prevalence Index (PI)	**2.1**

Significant bacteria issues.

From the single Gram positive swab the lab has identified many Human Pathogens at levels between 100 and 1000 times normal. The risk is assessed in the fourth quartile (worst)

21. Documents and data considered

21.1. PIV

21.1.1. The installation of the PIV by the landlord into a contaminated and decaying roof space/loft was a major mistake. The filter installed in this device is classified as coarse capturing only 65% OF dust over 10 micron.

21.1.2. In section 13 of this report Table 1 we identify the very large counts of particulates are below 10 micron

21.1.3. We refer to WHO (2009 Dampness and Mould) and Institute of medicine (2004) that recognise smaller hyphal fragments <8 micron by pass all human defences and can increase exposure to mould toxins by 40 fold.

21.1.4. This PIV Positive was effectively pumping all loft contamination into the occupied spaces of the home

21.1.5. A risk and hazard assessment should in my opinion, have been undertaken prior to installation and and equipment suitability, the risk of contamination that may or could be presumed to be present.

21.1.6. These issues are compounded when the landlord replaced the whole roof months after installing the PIV due to decay.

The filter efficiency of the Envirovent PIV Loft models EVL-HR, EVL-HWR, and EVL-HTS-R with the ISO Coarse 65% FILTERPIV-COARSE is specifically designed to capture coarse particles. The "ISO Coarse 65%" rating indicates that the filter is capable of capturing at least 65% of particles that are 10 micrometers or larger in diameter. This classification aligns with the European standard EN 779, which has been replaced by ISO 16890, the international standard for air filter testing and classification

(EnviroVent Ltd) (MVHR.shop).

21.2. Mould sampling

The landlord through their nominated contractors Pure Maintenance undertook extremely low levels of risk and hazard assessment for analysis of airborne genus (Total Spore Counts and DNA analyses)

21.3. The results of initial inspection show serious contamination recognised as potentially toxigenic in both air and surfaces.

21.6

The undertook two basic tests to assess the presence of mould. The lab results they provided the tenant showed VERY HIGH levels of Abnormal species likely to affect indoor air quality. In fact, the risk and hazard assessment from this laboratory doesn't go any higher and this should emphasise the danger the family was in.
The family have contemporaneous notes and email regarding their request for action due to their joint health conditions. These are shown in Table 6 and Table 7

Table 6

Overall assessment

Lounge

F

Our analysis shows that there are very high levels of mould in the sample. The species composition of the mould is abnormal and there are very high levels of mould species that thrive in damp indoor environments. This means that there is likely to be a damp problem in the building that is adversely affecting the indoor air quality.

Loft

D

Our analysis shows that there are elevated levels of mould in the sample and that the species composition of the mould is abnormal. This indicates that the building is either suffering from moisture damage or has suffered from moisture damage previously.

Table 7

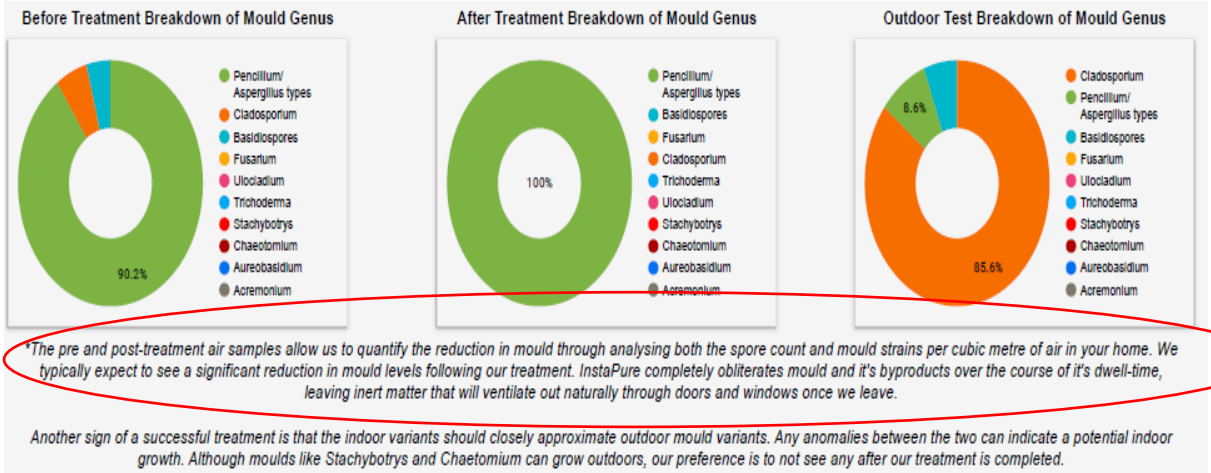
	Lounge	Loft
Outdoor species		
Alternaria alternata	2	9
Cladosporium cladosporides	60	2.675
Cladosporium herbarum	69	499
Low/fluctuating moisture levels		
Acremonium strictum	0	0
Aspergillus fumigatus	0	4
Aspergillus glaucus grp.	0	4
Aspergillus niger	1	2
Aspergillus versicolor	734	100
Cladosporium sphaerospermum	4.657	484
Mucor/Rhizopus grp.	632	35
Pen/Asp/Pae grp.	14.229	5.356
Penicillium chrysogenum	57	5
Penicillium expansum	9	9
Rhizopus stolonifer	1	0
Streptomyces spp.	153	49
Wallemia sebi	11.902	67
High moisture indicator		
Chaetomium globosum	1	24
Stachybotrys chartarum	0	0
Tricoderma viride	1	0
Ulocladium chartarum	0	0
Other species		
Universal fungi	195.914	12.249

21.4. Post treatment verification

Pure Maintenance provide their evidence of a 74.737% reduction, this leaves 25% still present. Moreover, in the spore reduction claim below, Table 8 Pure Maintenance state *"The pre and post-treatment air samples allow us to quantify the reduction in mould through analysing both the spore count and mould strains per cubic metre of air in your home.*

" We typically expect to see a significant reduction in mould levels following our treatment. InstaPure completely obliterates mould and it's byproducts over the course of it's dwell-time, leaving inert matter that will ventilate out naturally through doors and windows once we leave"

Pure Maintenance appear to have left the contamination in the property to become airborne and hopefully escape through windows. The WHO state dead mould fragments are 40 fold more hazardous than whole spores, therefore, Pure Maintenance have confirmed they have not only failed to decontaminate but actually increased the health risk to occupants.



21.5. In Table 9 it appears Pure Maintenance have shown they actually increased contamination with their post treatment verification.
In Table 9 we see the following issues between pre and post treatments.

21.6. It appears Cladosporium has become the major marker for decontamination success at 96.9 % of spores Cladosporium present but in the earlier sample taken by Pure Maintenance Table 4 it was absent?

21.7. Comparison between Pure Maintenance pre works air sampling (Table 4) shows the property contamination level has increased hyphal fragments post treatment.

Table 8

	Table 4 pre treatment 15/03/23	Table 9 Pre treatment 16/06/23	Post treatment 16/06/23
Aspergillus /Penicillium	210	1500	110
Basidiospores	160	210	210
Chaetomium Toxic	ND	13	ND
Cladosporium	ND	1900	430
Hyphal fragment's	40	ND	160

*ND Not detected

21.8. The data provided in Table 9 by Pure Maintenance shows Cladosporium genus as 57% of sample but the spore counts disagree in Table 10. Equally in DNA

analysis we see Cladosporium *Sphaerospermum* a toxigenic mould species at levels up to 2614 in the home and widely spread

21.9. The major issue here is we see in Table 10 that both pre and post treatment air sampling was undertaken on the same day 16/06/2023. The property was filled with a wet fog which would simply cause any airborne particulates to fall. This is sen even sweeping a yard when a spray of water is used to bring down dust levels.

21.10. The reality is as the moisture evaporates the fallen particles will rea aerosolise.

21.11. In Table 9 and 11 below Pure Maintenance provide two apparently different pre and post treatment test results. Significantly we review the statement below Table 11. Before treatment Penicillium /Aspergillus represented 90.2% of the sample but post treatment these potentially toxigenic species are 100% present?

21.12. In my opinion there are no post treatment verifications.

Table 9

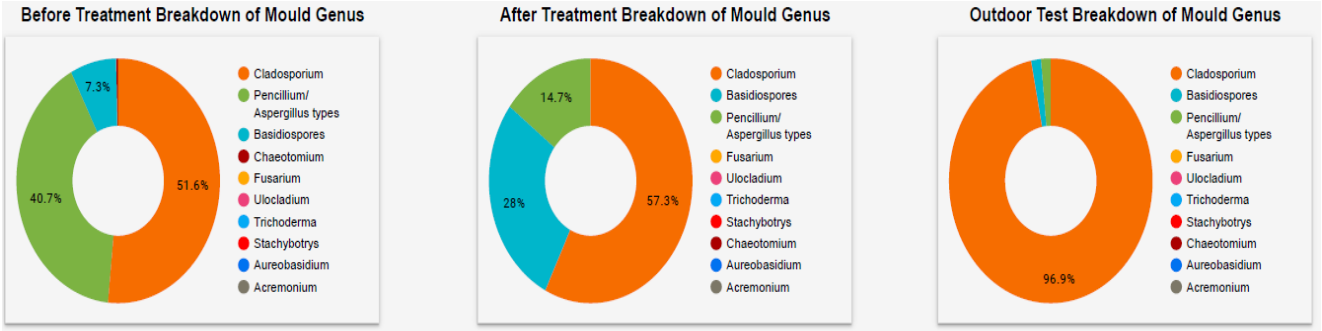
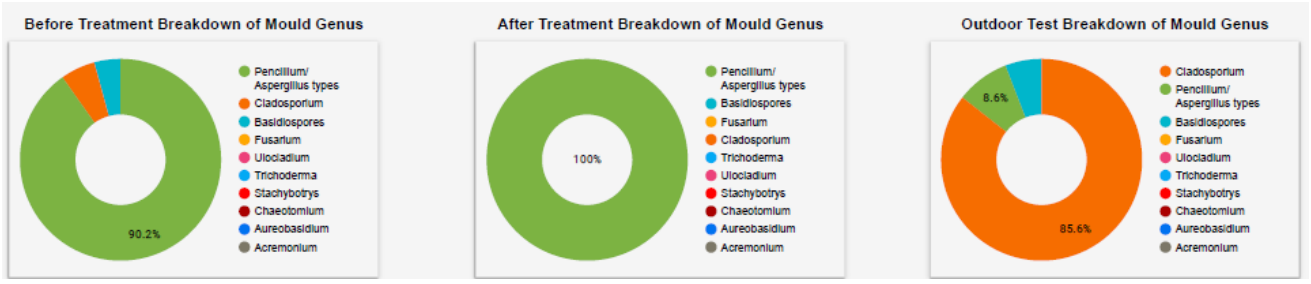


Table 11



Another sign of a successful treatment is that the indoor variants should closely approximate outdoor mould variants. Any anomalies between the two can indicate a potential indoor growth. Although moulds like Stachybotrys and Chaetomium can grow outdoors, our preference is to not see any after our treatment is completed.

Table 10

[redacted]
Date of Receipt: 06-23-2023
Date of Report: 06-26-2023

MoldREPORT
Eurofins EMLab P & K
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 Fax (623) 780-7695

Laboratory Results

MoldREPORT: Spore Trap Analysis

Location:	1: 5045 BT Hallway Top		2: 5045 AT Hallway Top		3: 5045 OT	
Comments (see below)	None		None		None	
Lab ID-Version‡:	16023171-1		16023172-1		16023173-1	
Analysis Date:	06/26/2023		06/26/2023		06/26/2023	
Spore types detected:	raw ct.	per m3	raw ct.	per m3	raw ct.	per m3
Aureobasidium	-	-	-	-	-	-
Basidiospores	5	270	4	210	4	210
Chaetomium	1	13	-	-	-	-
Cladosporium	35	1,900	8	430	245	13,000
Fusarium	-	-	-	-	-	-
Penicillium/Aspergillus types	28	1,500	2	110	4	210
Stachybotrys	-	-	-	-	-	-
Trichoderma	-	-	-	-	-	-
Ulocladium	-	-	-	-	-	-
Others	3	160	4	210	5	270
§ Total:		3,800		960		14,000
Additional Information:						
Hyphal fragments	-		160		53	
Skin cells	80 - 4,000		13 - 67		13 - 67	
Pollen	< 13		< 13		< 13	
Background debris (1-4)†	3		4		3	
Limit of detection	13		13		13	
Sample volume (liters)	75		75		75	

21.1. Failures ' actions and responsibilities

21.2. There is a clear duty of to provide a safe home for tenants and in my opinion there has been the following failures:

21.3. Failing to risk assess the loft and roof structure prior to installation of PIV which would pump readily identified mould around the home, (instead of pressurising home with fresh air as designed.

21.4. Failure to risk assess suitability of the Envirovent unit regarding filter efficiency which is clearly inadequate

21.5. Failure to act regarding risk assessment of family health when 10 out of 11 occupants display illness post PIV installation

21.6. Failure to employ or engage technically able surveyors capable of identifying wet or dry walls

21.7. Failure to investigate the suitability or qualification or competence of a contractor (Pure Maintenance) Reviewing the Pure Maintenance web site the only accreditation cited was a two day City & Guilds (CPD) type course covering water damage and mould etc. Totally inadequate.

21.8. Using an unqualified contractor Pure Maintenance to apply a chemical process which has no efficacy regarding mould removal, or which complies with any recognised industry protocol.

21.9. Using an unqualified contractor to advise or promote goods or services detrimental to the tenant.

22. Conclusions

The following conclusions are based on the information provided to us or gathered in the survey and coupled with laboratory analysis or monitoring equipment. While this report was written by a qualified expert in Indoor Environmental Health you must recognise this report is a basic non-intrusive survey and is a snapshot in time. You should confirm all findings prior to making life changing decisions.

I am an Indoor Environmental Hygienist, and my role is to collect data and provide an outline of risks, hazards and causation. I am not medically qualified to provide health advice other than risks, and these should be reviewed by professionals for action.

22.1. No visible mould or detrimental lifestyle issues identified, the tenant has not in my opinion caused any of the issues identified

22.2. Heating and insulation appear to be sufficient although loft is a little warm and could perhaps benefit form additional insulation.

22.3. Informed areas of historic water damage areas were confirmed as still being unacceptably wet

22.4. Although no roof or loft ventilation is visible the loft has dry air and timbers were dry

.

22.5. Some masonry walls are damp, possibly through minor external damage

22.6. The floor cavity below the previous wet room on first floor, is contaminated as is the lounge ceiling where water was seen to ingress Photographic evidence supplied by tenant)

22.7. All areas of the home have elevated particle counts of unknown composition but in the risk area (size) of hyphal fragments.

22.8. The house has far higher contamination levels than ambient air.

22.9. From these initial findings the property does not appear to have a moisture or active mould problem but residual mould risks from fragments and desiccated spores which are considered as a much higher risk (REF WHO 2009 Dampness and Mould)

22.10. In my opinion the loft has been and is the main reservoir of contamination and installation of the PIV to ventilate the house has simply contaminated the whole house due to inadequate installation of ventilation system and filtration.

22.11. The current concerns are historic water damage, biological amplification, spread and distribution by fogging and opening cavities and the installation of a PIV system.

22.11.1. Note PIV systems should not be installed where contamination estimated at less than 10 microns is present as the unit relies on an almost worthless filtration system

22.12. In my opinion it appears the installation of the PIV into a decaying roof and loft space spread contamination throughout the property.

22.13. In my opinion the Mould treatment of peracetic acid caused an increase in contamination and left hyphal fragment which the contractor (Pure Maintenance) expects to exit the property through windows.(ref 21.5)

22.13.1. A literature review will confirm this as untrue and hyphal fragments are more likely to continuously re aerosolise into the breathing zone and remain present due to Brownian Motion

22.14. The property is, based on all evidence collected, a health risk to occupants.

22.15. The family have been exposed to potentially toxigenic moulds and bacteria which produce chemicals and inflammagens. Some of these contaminates identified are contusive to health issues described to me

22.16. Some of these chemicals require medical treatment to leave the body and I recommend expert medical help from toxicologists NOT but not GPs who generally have no training in toxicology.

22.17. In my opinion the family has needlessly been exposed to extremely toxic contamination over a long period of due to the incompetent actions of the and their nominated contractors.

22.18. The installed a ventilation system which was inappropriate and resulted in contamination form the decaying loft being pushed throughout the property.

22.19. The have in my opinion, used incompetent, unqualified contractors who provided a decontamination which increased risks and hazards.

22.20. In my opinion the took advice on health risk reduction for a family of 11, ten of whom were reported sick, from an unqualified company.

23. Recommendations

24. Executive summary

24.1. have failed to professionally manage a tenant's notified complaint of mould and developing health issues.

24.2. The landlord engaged incompetent contractors and untrained staff to manage the risk and hazards which resulted in escalating health issues

24.3. The reported and escalating illness of 10 out of a family of 11 should have alerted someone to act, not least when they knew the property was decaying and required a new roof and recognised the wrong installation of a ventilation system.

24.4. The family of 11 have been exposed to serious levels of contamination which may require far reaching health care.

25. Statement of truth
I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge, and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer.

26. CPR part 35 confirmation
In preparing this report I confirm I understand my duty is to assist the Court on those matters within my areas of expertise and that this duty overrides any obligations to my instructing solicitor or their client.
I confirm I have no personal or professional connection with any of the parties or advisors involved in this case which could result in a conflict of interests. I confirm that I am aware of the Civil Procedure Rules Part 35 and Practice direction 35 and the protocol for the Instruction of Experts to give Evidence in Civil Claims and the practice direction on pre-action conduct.

27. Photos



Sub floor wet room (photo provided by tenant

Visible mould to kitchen cabinet and ceiling removed during Pure Maintenance process
Photos provided by client

Redacted skin issues focused bacterial sampling addition

NO soffit or roof vents identified to new roof

The PIV installed with coarse filters and 67% capture of 10-micron particulate. The contamination present in June 2024 confirms the following levels and sized of particulate present are in the thousand and this is after the roof was removed for replacement in 2022

Particle Size µ	.3	.5	1.0	2.5	5.0	10
	5403	2279	650	100	13	6
	8653	3988	993	301	79	59

CV Biography of Jeff Charlton 07990 500 999

Disaster recovery, restoration and decontamination. Counter terrorism specialising in defence of buildings and protection of occupants. Contingency planning and resilience. Focusing on building related illness since 2010

1. Member of Surviving Mold (sic) and International Society for Environmental Acquired Illness (ISEAI) group of Indoor Environmental Hygienists

2. Board certified Indoor Environmental Professional Listed in Council Certified Indoor Environmental Consultant

3. Certified Member of Chartered Institute of Environmental Health UK
4. Scientific member British Environmental Medicine Society
5. Contracted to European Commission on Terrorist CBRN planning and response. Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) https://ec.europa.eu/health/scientific_committees/scheer_en

6. Qualified member Emergency Planning Society professional working group on terrorism CBRN
7. Certified concrete slab testing USA
8. Two published peer reviewed papers on mould illness and assessments

---

9. Worked with Mi5 at Thames house in a team to design building defence against terrorist CBR attack in the capital and central business district. From my developed www.cbr-response.com web site and basis for BRE paper.
10. Presented to House of Commons select committee on failures in flood response and recovery. Ref EV w2 https://publications.parliament.uk/pa/cm201314/cmselect/cmenvfru/330/330vw.pdf
11. Worked with National Counter Terrorist Office (Chris Philips) at Thames House rolling out national program on CBRN defence and awareness /response
12. Worked with Police at Central training college to assess Lockerbie and local response to widespread disaster and secondary attack by insurgents
13. Worked with police at Ryton police CBRN centre to develop strategies to evacuate and protect CBRN casualties
14. Worked with National Health and fire services to audit response to terrorist attack in Reading hospital and local shopping mal
15. Worked with Emergency Planners at Morton in Marsh to develop contingency plans for wide spread natural or terrorist radiological event
16. Working with Cabinet office and Government decontamination service, wrote and presented terrorist CBR attack on London shopping centre using available CBR agents designed to be lethal in combination.
17. Provided a review of CBR terrorist response at RUSI (Whitehall)
    https://rusi.org/publication/contingency-plans-terrorist-cbr-attack
18. Presented various strategies on natural disaster recovery techniques to Emergency Planning Society
19. Visiting lecturer at Cranfield Royal Military College in CBRNe (Tony Moor)
20. Presented CBRN defence protocols to FBI and Homeland Security in Kentucky USA
21. Provided seminars to Emergency planners on flood and disaster recovery
22. Developed novel techniques for IED detection and presented at Porton Down
23. Provided seminars at EMP conference on Gaussian dispersal around Hot Zones and PPE limitations of emergency responders
24. Sat on EU committee in Brussels on CWA 16106.10 for the development and

publication of victim and emergency services response to terrorist CBRN event. Now a British standard

25. Provided a CBRN terrorism scenario on shipping

    http://gcaptain.com/what-if-chemical-biological-radiation-attack-san-francisco/

26. Speaker CBRN conference USA with Homeland Defense & FBI

    https://www.slideshare.net/dirrtybass/cbrn2011pdfw

- Over 30 years worldwide experience in disaster recovery and restoration involving floods, fires and explosions as well as general and specific decontamination and sanitation, including mould and associated biological contaminants.
- Trained with internationally recognised industry leaders such as Cliff Zlotnik, Pat Moffatt, Marty King, Jim Holland and Professor Ronald Alvin and Tony Gibbs (Porton Down) in all areas of disaster recovery, restoration and decontamination.
- Obtained highest practical and technically appropriate qualifications throughout career. I have been Involved with mould & biological health issues since 1999. Initially obtained US qualifications, as Britain had none.
- Made initial funding available and became founding chairman of British Damage Management Association UK.
- Achieved accredited associate membership with Chartered Institute of Environmental Health and USA Board Certified (ANSI) Certified Indoor Environmental Consultant
- Post-Gulf War in Kuwait at times employing over 500 decontamination personnel working in hazardous conditions to restore hotels, oil fields and strategic government buildings. Provide scope of works to US Corps of Engineers for restoration of Emirs' palaces, Ministries of Electricity and Water and ministry of Awqaf and Islamic affairs.
- Working with world-wide organisations, exposed to the very best technology and forensic investigators and have applied their technologies, approach and resources in the UK.
- Skilled in using state of the art analysis and measurement technology and equipment. I have established strong links with specialists in affiliated industries to provide supporting expertise and evidence. This includes utilising ISO accredited laboratories, particularly in Indoor Air Quality (IAQ) testing.
- Acted as both consulting and testifying expert in various disputes, including testimony as Sole Joint Expert under Part 35 and including the Financial Ombudsman, in cases involving building related damage, design and construction defects, toxic mould identification and analysis, and building related health effects.
- Successfully challenged UK experts and laboratories on possible building contamination and exposure issues, providing clear evidence and repeatable laboratory analysis complying with the World Health Organization Guidelines for Indoor Air Quality "Dampness and Mould" (2009) and reflecting British Standards.
- Peer-voted awards, including Contingency Insurance Risk (CIR) Lifetime Achievement Award (2013), CIR Disaster Recovery of the Year (2001, 1999) shortlist (2002), as well as awards for Innovative Product (BANG 2010, CIR 2010, and CBON 2001, training in counter terrorism).
- Participated on Standards, Setting professional bodies; training; emergency planning seminars.

- Invited to speak in House of Commons at Parliamentary Joint Committee on Flood Insurance headed by Jonathan Evans MP to provide evidence on flood restoration and criticising industry response February 2014
- Frequent guest on Sky TV, BBC TV and radio, ITV and Channel 4.
- Participated as invited technical expert to EU and British standards committees on diverse issues covering Business Continuity, Disaster Recovery and Counter Terrorism and victim support and response to terrorist CBR event.
- Visiting lecturer in counter terrorism at Cranfield Royal Military College under Tony Moore, speaker at various international conferences on counter terrorism and specializing in CBRN events and pandemic contingency planning, including FBI and Homeland Defence.
- Short listed Emergency Planning Society in 2014 Innovative training awards in disaster recovery
- Designed and presented novel solutions to Car bomb and road side IEDs to Ministry of Defence at Porton Down 2011
- 2018 Wrote and presented a seminar on anthrax and CBR decontamination at MOD Larkhill Garrison for and on behalf of Emergency Planners, CBRN professional working group at Salisbury.
- **SELECTED PROFESSIONAL QUALIFICATION AND ACCREDITATIONS**

  Please note all subscriptions and positions ceased and copies all certificates can be seen on https://www.buildingforensics.co.uk/our-accreditation.html

- **Recovery and Restoration**. The following certifications cover all aspects of disaster recovery and restoration:
- Certified Restorer USA (highest recognised industry certification)
- BDMA Senior Technician UK (Co-founded BDMA; Honorary Fellow; wrote the syllabus and exam questions)
- **Business Continuity**. Certified member BCI (relinquished)
- Chair London Forum Business Continuity Institute (relinquished)
- Co-founder BANG (alternative to BCI)

Water Damage.

- Water Loss Specialist (RIA ASCR) Highest USA certification
- Applied Structural Drying Hydro lab USA
- Achieved Instructor status (95%+ with: IICRC; RIA; Drieaze;
- Provided technical input to IICRC S500 ANSI and S520 standards
- Wrote BDMA's current Technical Guidelines and Standards 2014, (BDMA refused to accept at executive level due to my refusal to drop toxic mould issues)

Environmental Hygienist

- Member Chartered Institute of Environmental Health (UK)
- Council Certified Indoor Environmental Consultant (USA) (ANSI)

Fire Damage.

- IICRC Instructor status

Mould.

- Indoor Environmental Surveys ET&T USA
- American Congress of Governmental Industrial Hygienists 2002
- Applied Microbial remediation Technician Restoration Consultants S520 USA
- IICRC AMRT
- American Council for Accredited Certification Indoor Environmental Consultant

Asbestos.

- Qualified and certified by British Institute of Occupational Health P405& P401
- Licensed Asbestos removal supervisor; licensed asbestos contractor (relinquished)

Engineering.

- ONC engineering
- City & Guilds Mechanical Craft Practice 1 & 11
- Certified associate member ISSE and Hon Fellow (relinquished)

Sanitation and Decontamination.

- Certified Mechanical Hygienist RIA USA
- Member Chartered Institute Environmental Hygiene
- American Indoor Air strategies
- Odour destruction and sanitation INTYG Sweden

Counter Terrorism and Contingency Planning.

- Certified Homeland security (National Response Teams) USA
- Certified member Emergency Planning Society Professional working Group CBRN terrorism UK
- Visiting Lecturer Cranfield Royal military college under Tony Moor

Forensic Investigation.

- Level 1 American College of Forensic Examiners
- Member Institute of American Forensic Examiners

Crime Scene Meth Labs and Cannabis Farms.

- National Institute Decontamination (USA)
- Bio Recovery and Decontamination (UK)

STANDARDS SETTING

2013. Wrote industry Guidelines and Standards for British Damage Management Association ("BDMA") "Technical Ref Manual" and the portions of British Standards Institute ("BSI") PAS 64 guidelines relating to national flood restoration guidelines.

2011 Wrote a presentation to Emergency Planning conference on novel approach to Anthrax (White Powder) event.

2012. Wrote and presented to Emergency Planning conference a desk top exercise on Chemical, Biological, Radiological and Nuclear Centre ("CBRN") simulation of terrorist attack to shopping Centre in association with HPA Cabinet office and Government Decontamination Service

2007 to 2016 – Assistance in writing various papers for British Standard Institute, BDMA, Insurance Industry Audits for flood restoration.

Responsible for the formation and initial funding and founding chairman of the BDMA, Institute of Inspection Cleaning & Restoration (UK Fire & Flood) and

Restoration Industry Association. Actively taken part in committees, debates and presentations.

Previous chairman of BSI Business Continuity Institute London Forum and certified member of Emergency Planning Society CBRNe counter terrorism planning.

Founder of Bio Recovery Decontamination International, Member of BSI standards committee on BS25999 on business continuity.

Recognised expert on CBRN terrorism CEN and technical committee member for European Commission in Brussels etc CWA 16106:2010.

Provided expert support to committees on:

- HVCA Ventilation and indoor air quality. Committee on ductwork sanitation standard TR series
- IICRC S520 mould standard for decontamination and clearance
- BSI PAS 64 Disaster restoration
- BSI Business continuity
- CEN (European Standards) CWA 16106, technical input on protection of EU citizen (600 million) in terrorist CBRN attack
- British Damage Management Association Exam questions and, mission statement.
- BDMA Technical Guidelines and Standards Disaster restoration and recovery (refused but not explained other than my refusal to comply with their requirements that mould is not toxic)

2016 Input to BS12999 and resultant complaint to Secretary of State and HSE with agreement the standard should be re written, leading tom HSE industry investigation 2017

- Qualified in USA in HAZWOPA 40 Hour Health and Safety confined space and CBR decontamination

2018 Wrote and presented a seminar on anthrax and CBR decontamination at MOD Larkhill Garrison for and on behalf of Emergency Planners, CBRN professional working group at Salisbury.

SELECTED INDUSTRY AWARDS

2021 On Line Expert witness of the Year

2013 awarded most prestigious Certified Indoor Environmental Consultant through American Council Accreditation Certification, recognised by US government agencies and UK NHS Aspergillus Centre as most appropriate qualification for mould and IAQ investigation

Won, as lead technician, two UK (CIR) Disaster Recovery of the Year awards 1999-2001; runner up in three other years

In 2013 won two awards with "Security on line emag" CBRN counter terrorism/contingency Trainer of the Year and Disaster Recovery trainer of the year awards.

Won ‘Lifetime achievement’ award at the prestigious CIR awards and on ‘Trainer of the Year’ award for 'Counter Terrorism and Contingency' planning in 2013

2015 Contingency Insurance Awards “Innovative product shortlisted 7 CPD training modules on water damage and contamination
2013 Lifetime Achievement industry voted CIR magazine
2013 Security Industry E-Mag Award - CBRN Training and Consultancy Provider of the Year
2010 BANG Innovative Product of the Year Award
2010 CIR Innovative Product of the Year Award
2003 Innovative Product of the Year Award
2002 UK (CIR) Disaster Recovery of the Year Award - shortlisted
2002 UK (CIR) Product Designer CBON Terrorist Attack –Software training product
2002 UK (CIR) Disaster Recovery of the Year Award – Lead Technician – shortlisted
2001 Innovative Product of the Year – CBON Terrorism Building Defence Program
2001 UK (CIR) Disaster Recovery of the Year Award – Lead Technician - winner
1999 UK (CIR) Disaster Recovery of the Year Award – Lead Technician – winner

I have been engaged in worldwide disaster recovery involving flooding, explosion, contamination and fire for over 25 years.
I have attained the highest internationally recognised qualification as:

- Certified Restorer, **CR**
- Water Loss Specialist, **WLS**
- Certified Mechanical Hygienist **CMH**
- Member Chartered Institute of Environmental Health
- Certified Indoor Environmental Consultant through American Council of Accredited Certification (ANSI-ISO) **IEH (**Indoor Environmental Consultant**)**
- Senior Tech and Hon Fellow BDMA in the UK and founding chairman.
- Applied Microbial Restoration Technician IICRC **AMRT**
- Level 1 certification in Infra-red thermography.
- Certified Drone pilot

2. Letter of instruction