

Rev 1 Dec 2019 JC

Most people struggle to find the answers to mould and building related illness. Many spend a lot of money on medical treatment but don't get better, many buy mould surveys that appear to be worthwhile but are misleading.

The following information sets out the types of useful surveys and inspections as described by international bodies. It is now generally recognised that any form of medical treatment is unlikely to be successful if the patient is constantly exposed to the inflammation triggers.

We can assist you with choosing the best options based on your medical condition, medical practitioner requirements or budget. We work with NHS and hospitals, doctors and nutritionists who specialise in mould and biotoxin disease. It is therefore, in everyone's interests to ensure the correct protocols are used to achieve the target results, as required within your budget. You will note the alternative sampling techniques each have benefits and shortfalls, but we can assist you in getting the result you need and require.

**In most cases we simply recommend the basic survey with air testing**

## Services provided by Building Forensics

We have provided the explanations as a guide to the sampling and analysis you might require and to fit your budget.

## 1 The Basic survey

The objective of this investigation is to assess the cause and effect of building related illness or mould. This survey is essential as the starting point of all testing and identifies high risk areas where sampling and further investigation may be required.

The benefits of this survey include:

- Assess historic or current water damage and mould risks
- Identify construction design defect
- Undertake thermal imaging to assess possible damp areas from "Dew Point" condensation, lack of insulation etc
- Assess airborne particulate contamination levels
- Moisture map to assess high risk areas and surfaces and cavities
- Measurement of air moisture levels in grams per kilogram against outside to establish building moisture levels and potential for mould in areas
- Identify high risk areas as a possible source of mould or biological amplification

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- Provides the basis for sampling from higher risk areas
- Provide conclusions and Recommendations

Remember biological growth is often hidden and without remediating the cause of mould, it will return whatever you do.

## 2 Air sampling for Mould Genus

From the basic survey we identify the highest risk areas for air sampling. This type of sampling provides a count of airborne spores and identifies some of the water damage indicators. It is a basic step in assessing bio amplification. We sample air in high risk areas as identified in the basic survey.

Location:	1: Hamster				2: Lounge				3: Daughters Bed				4: Ambient			
Comments (see below)	None				None				None				None			
Lab ID-Version#:	10208429-1				10208430-1				10208431-1				10208432-1			
Analysis Date:	05/03/2019				05/03/2019				05/03/2019				05/03/2019			
Sample volume (liters)	30				30				30				30			
Background debris (1-4+)††	2+				2+				2+				1+			
	raw ct.	Count/m3	DL/m3*	%	raw ct.	Count/m3	DL/m3*	%	raw ct.	Count/m3	DL/m3*	%	raw ct.	Count/m3	DL/m3*	%
Hypohal fragments	3	100	33	n/a												
Pollen					1	33	33	n/a					8	270	33	n/a
<b>§ TOTAL FUNGAL SPORES</b>	<b>22</b>	<b>2,200</b>	<b>n/a</b>	<b>100</b>	<b>5</b>	<b>670</b>	<b>n/a</b>	<b>100</b>	<b>7</b>	<b>930</b>	<b>n/a</b>	<b>100</b>	<b>5</b>	<b>670</b>	<b>n/a</b>	<b>100</b>
Ascospores	1	130	130	6					1	130	130	14	2	270	130	40
Basidiospores	3	400	130	18	2	270	130	40	3	400	130	43	1	130	130	20
Chaetomium																
Cladosporium																
Other colorless																
Penicillium/Aspergillus types	11	1,500	130	66	3	400	130	60	3	400	130	43	2	270	130	40
Phycomyces																
Rusts																
Smuts, Penicconia, Myxozymetes	7	230	33	10												
Stachybotrys																
Stemphylium																
Torula																
Ulocladium																

A typical air sample through 4 different high-risk rooms identified from the basic survey

### **3 Surface sampling for QPCR-DNA (Sometimes called ERMI)**

In this test we sample just 5 micrograms of settled dust from high risk areas as identified in our basic survey. We analyse 36 mould species and compare normal environment moulds against those known to cause health issues. While many use ERMI as a risk tool the US government (Environmental Protection Agency (EPA) categorically state this is a research tool and cannot be used for this purpose. You should note here we also assess fragments of spores and Hyphae which according to WHO are a significantly higher risk than whole spores. The ERMI score does not reflect risk or hazard but Building Forensics will assess the species identified and quantity these in terms of risk and hazard.



when compared to outside. In this example we see significant differences especially with ND (not detected). We assess the species and levels and provide a risk assessment

Species Identification	Spores/m <sup>3</sup> of Air		Relative Abundance (%) of Species
	Inside	Outside	
<i>Acremonium strictum</i>	ND	ND	0.00
<i>Alternaria alternata</i>	ND	ND	0.00
Anigr*	56	ND	0.09
<i>Aspergillus flavus/oryzae</i>	ND	ND	0.00
<i>Aspergillus fumigatus, Neosartorya fischeri</i>	ND	ND	0.00
<i>Aspergillus ochraceus/ostianus</i>	ND	ND	0.00
<i>Aspergillus penicillioides</i>	139	ND	0.23
<i>Aspergillus restrictus/caesillus/conicus</i>	ND	ND	0.00
<i>Aspergillus sclerotiorum</i>	ND	ND	0.00
<i>Aspergillus sydowii</i>	1,103	ND	2.00
<i>Aspergillus unguis</i>	145	ND	0.24
<i>Aspergillus ustus</i>	19	ND	0.03
<i>Aspergillus versicolor</i>	5,470	ND	9.16
<i>Aureobasidium pullulans</i>	39	23	0.07
<i>Chaetomium globosum</i>	ND	ND	0.00
<i>Cladosporium cladosporioides</i> svar. 1	ND	7	0.00
<i>Cladosporium cladosporioides</i> svar. 2	136	120	0.23
<i>Cladosporium herbarum</i>	7	ND	0.01
<i>Cladosporium sphaerospermum</i>	7	14	0.01
Eamst*	120	65	0.20
<i>Epicoccum nigrum</i>	7	ND	0.01
Muc1*	7	7	0.01
<i>Paecilomyces variotii</i>	ND	ND	0.00
PenGrp2*	ND	ND	0.00
<i>Penicillium brevicompactum/stoloniferum</i>	596	50	1.00
<i>Penicillium chrysogenum</i>	33	ND	0.06
<i>Penicillium corylophilum</i>	ND	ND	0.00
<i>Penicillium purpurogenum</i>	ND	ND	0.00
<i>Penicillium variable</i>	ND	ND	0.00
Pspn2*	2,101	ND	3.52
<i>Rhizopus stolonifer</i>	ND	ND	0.00
<i>Scopulariopsis brevicaulis/fusca</i>	ND	ND	0.00
<i>Scopulariopsis chartarum</i>	25	ND	0.04
<i>Stachybotrys chartarum</i>	7	ND	0.01
<i>Trichoderma viride/atroviride/koningii</i>	49,628	1,513	83.07
<i>Wallemia sebi</i>	7	ND	0.01
Total Spores:	59,744	1,799	

## 5 Testing for Mycotoxins in the property

Many health care professionals use urine tests to assess mycotoxin presence. While Mycotoxins have several sources, it may be beneficial to assess the presence of both the mycotoxins and mould species capable of producing these health hazards.

The test involves taking dust samples from areas identified in the basic survey.

<b>Mould Species</b>				
Aspergillus fumigatus	Aspergillus flavus	Aspergillus niger	Aspergillus versicolor	Aspergillus ochraceus
<i>Aspergillus penicilloides</i>	Penicillium brevicompactum	Stachybotrys chartarum	Wallemia sebi	

<b>Mycotoxins</b>			
Gliotoxin	Aflatoxin	Ochratoxin	Sterigmatocystin
Mycophenolic Acid	Macrocyclic Trichothecenes	Chaetoglobosins	Plus over 600 mycotoxins

### Typical mycotoxins as identified in Real Time urine tests

## 6 Gram Positive and Negative bacteria

These have become the most significant emerging health issue in the water damaged buildings. These types of bacteria can produce biotoxins like the mycotoxins of mould and synergistic effects can multiply the health hazards of mould and bacteria.

The scoring ranges as following table

<b>Score</b>	<b>Score range</b>	<b>Interpretation</b>
<b>Q1</b>	9 or below	Indicative of healthy building
<b>Q2</b>	Between 10 & 15	Further investigation suggested
<b>Q3</b>	Greater than 15	Suggestive of building related illness

## 7 The HERTSMI -2 test

This is a low-cost test which provides a risk assessment for those diagnosed with CIRIS (Chronic Inflammatory Response). In this test we sample surfaces and analysis just the Big 5 species of mould which have been assessed as the highest risk factors when entering a property.

HERTSMI -2 is an acronym for Heath Effects Roster of Type -Specific Formers of Mycotoxins and inflammagens (2<sup>nd</sup> version) as developed by Dr Ritchie Shoemaker

Species	Spore E./mg	Weighting
<i>Aspergillus penicillioides</i>	151	6
<i>Aspergillus versicolor</i>	23	4
<i>Chaetomium globosum</i>	37	6
<i>Stachybotrys chartarum</i>	ND	0
<i>Wallemia sebi</i>	41	0
<b>HERTSMI-2 Score =</b>		<b>16</b>

Colour coded interpretation	
If 10 or below	In only 17% of cases, re-occupancy of building following mould remediation has led to relapse of CIRIS or WDB symptoms
If between 11 to 15	Borderline further remediation and assessment may be required
If greater than 15	Re occupation is ill advised until further remediation and re assessment are conclusive

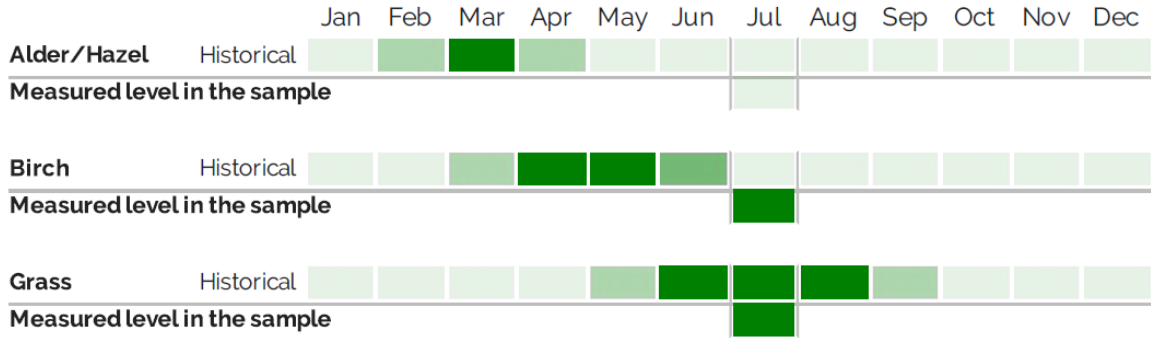
## 8 The basic DNA swab

This simple swab test is used to gather dust and a fast turnaround of just a couple of days with confirm the presence of the following potentially toxic moulds and bacteria.

Moisture levels	Species			
Outdoor Species	<i>Alternaria alternata</i>	<i>Cladosporium cladosporoides</i>	<i>Cladosporium herbarum</i>	
Low/ fluctuating	<i>Penicillium expansum</i>	<i>Aspergillus versicolor</i>	<i>Acremonium strictum</i>	Pen/Asp/Pae grp.
Moisture levels	<i>Aspergillus glaucus</i> grp.	Universal fungi	<i>Mucor/Rhizopus</i> grp.	<i>Penicillium chrysogenum</i>
	<i>Aspergillus niger</i>	<i>Rhizopus stolonifer</i>	<i>Aspergillus fumigatus</i>	<i>Wallemia sebi</i>
	<i>Cladosporium sphaerospermum</i>			
High Moisture indicators	<i>Chaetomium globosum</i>	<i>Trichoderma viride</i>	<i>Ulocladium chartarum</i>	<i>Stachybotrys chartarum</i>

In addition:

- The bacteria *Streptomyces* spp.
- Several groups of plant pollen to determine age of dust and distinguish indoor and outdoor sources
- The following table also uses pollen to assess age of dust



## 9 Volatile Organic Compounds VOCs

VOCs are gases which are released from wet materials, off gas from some materials (usually treated with flame retardants or some form of chemical treatment) mould and of course the environment.

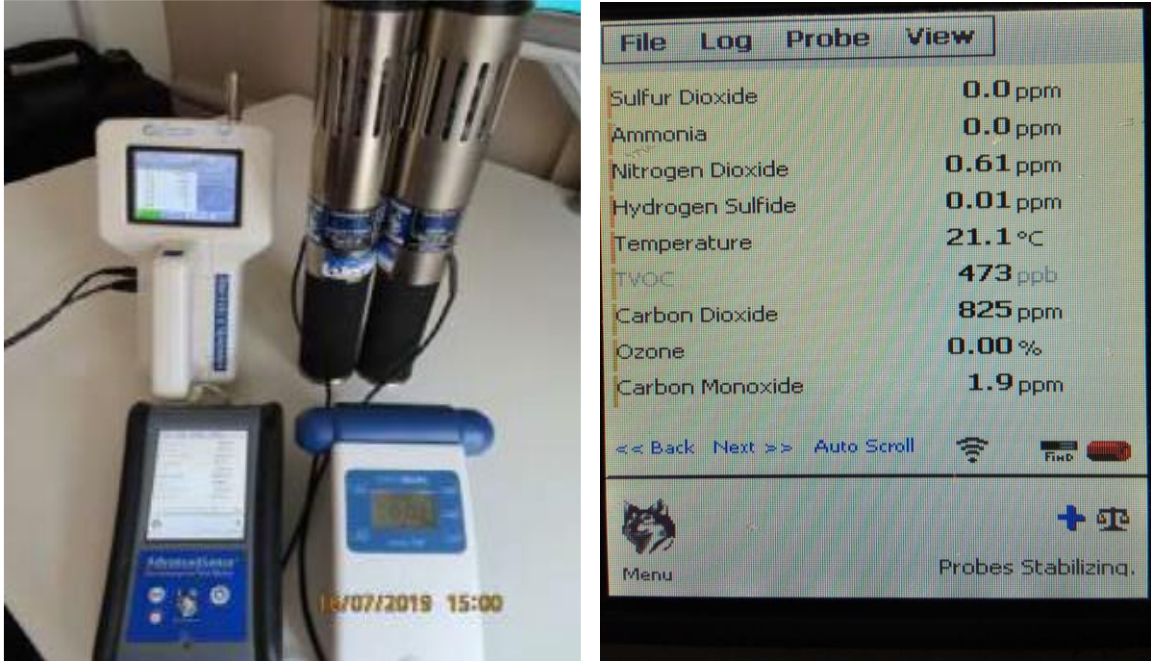
**Typically, we use two forms of sampling**

### Portable Air sampling and analysis

This allows us to move around the property and identify some specific chemical sources. Occasionally we find building related illness may be due to excessively high counts of the following gases. This means with location detectors we can identify the source. In some cases we find toxic gases are the likely cause of poor health

VOC type	Description	Issues
TVOC	Total Volatile Organic Compounds	Release from inside building
CO <sup>2</sup>	Carbon Dioxide	Poor ventilation
CO	Carbon monoxide	Fossil fuel burning problems
O <sup>3</sup>	Ozone	Asthmagen air cleaners
NO <sup>2</sup>	Nitrogen Dioxide	Nitric acid Traffic issues
SO <sup>2</sup>	Sulphur Dioxide	Sulphuric acid Traffic issues
CH <sup>2</sup> O	Formaldehyde	Carcinogen building materials
H <sup>2</sup> S	Hydrogen Sulfide	Sewer Gas Harmful





The portable real time analysis of specific gases and Total VOCs

## 10 Specific VOC analysis

We can also provide an in-depth analysis of over 700 different gases and risk factors including VOCs released by moulds. This may be important in a court case

Building Related Sources		Mixed Building and Lifestyle Sources		Lifestyle Related Sources	
<i>See page 7 for more detail.</i>		<i>See page 8 for more detail.</i>		<i>See page 9 for more detail.</i>	
N	Coatings (Paints, Varnishes, etc.)	N	Building Materials-Toluene Based	N	Personal Care Products
N	PVC Cement	N	Gasoline	N	Alcohol Products
N	HFCs and CFCs (Freons™)	N	Fuel Oil, Diesel Fuel, Kerosene	N	Odorants and Fragrances
		N	Moth Balls (Naphthalene Based)	N	Dry Cleaning Solvents
		N	Moth Crystals (p-Dichlorobenzene Based)	N	Medicinals
		N	Light Hydrocarbons		
		N	Light Solvents		
		N	Methylene Chloride		

Note: Severity levels begin at Normal or Minimal and progress through Moderate, Elevated, High and/or Severe. The color progression from green to red indicates results that are increasingly atypical and suggest potentially higher risk.



## 11 Drone Survey

We are licensed Drone pilots under CAA registration. We use both visible light and infra-red scanners to assess roof and chimney faults regarding construction defect and insulation which may result in dew point condensation and mould growth

