

Surveyor Jeff Charlton

Date of survey 6th May 2009

Date of report 19th may 2009

Report number 6/05/09 JC

1.0 Objective and Hypothesis

The following survey and report follows a request to assess possible or potential health and contamination problems which may or may not be present at the above property.

The contamination, if present, is believed to have originated or occurred following a fire in a kitchen microwave some two years ago. There is also the possibility of mould and mycotoxins, the result of a water loss in the kitchen said to be caused by restoration contractors and or the use of chemicals or additives used in the restoration program.

A visual and infra red survey was undertaken within the kitchen area to identify and confirm test protocols and areas for further investigation.

2.0 Infra red & moisture content

The camera showed some temperature differentials in the ceiling and floor indicating dampness. These areas were investigated with both conductive and radio moisture meters. These were the same areas found in my original report dated 23rd Feb 09 although moisture content had reduced indicating some drying out.

3.0 Sampling & Measurement

- a. Vocs¹ were sampled in the still air over a 3.5 hour period using absorbent tubes and calibrated pump.
- b. A hole was cut into the wet area of the kitchen ceiling to assess moisture content and potential mould growth or contamination present.
- c. A Grimm particle counter was employed to ensure particulate levels (dust) had dropped prior to further sampling.
- d. A Foxboro Miran Infra Red analyser was used to identify potential quick reference contaminants and the low levels of chemicals were identified in Table 5 and are listed for interest purposes only.

¹ Volatile Organic Chemicals

- e. Negative pressure of 20 Pascal's was installed to the back lounge and directly to kitchen door to encourage air flow from the kitchen voids and interstitial cavities and a laminar air flow was confirmed emanating from the cut hole in the ceiling by chemical trace smoke.
- f. Further air sampling as in (a) was undertaken for a period of 3.5 hours to assess possible differences in negative or pressure or disturbed air. No charge was made for this as it was of interest to the author.
- g. Bressler patches were affixed to sooty areas adjacent to boiler to measure chloride contamination levels.
- h. Cassettes were used to capture mould spores and fragments in both viable and non viable forms. These samples were taken at 30 liters and were duplicated in both standing and disturbed air.
- i. A ceramic floor tile was removed following moisture scanning to assess wood base moisture content.
- j. Swabs in Spectroscopy grade Hexane were used to wipe for SVOCs² with blind samples taken for possible Hexane contamination. The area swabbed was between the Bressler patches adjacent to the boiler in the kitchen.

² Semi Volatile Organic Chemicals

4.0 Data Recorded on 6th May 2009

Site arrival 10:00 sampling completed 18:00

Table 1 Specific humidity

Area	Temp C	Relative Hum	Specific Hum
Ambient	20	48	.007 kg/kg
Home	18	59	.008 kg/kg

Table 2 Moisture content

Area	Moisture content	Equilibrium Mc
Beneath Floor tile	18%	<8% Adjacent area
Joist in opened ceiling cavity	12%	<9% Adjacent area
Plasterboard from cut out	13.5% upper	2%
Plasterboard from cut out	11% lower	2%

Table 3 Chloride levels Readings taken @19c and measured in $\mu\text{s}/\text{cm}^2$

Area	Base conductivity	Reading	Chloride level
Boiler cupboard	15	115	33
Boiler cupboard	5	81	25

Note. Over 8 is unacceptable

Table 4 Thoracic dust Grimm Real time particle analysis 2.5 micron PPM

Actions	Time	Parts per Million
Opening doors	10:30	1198
Opening cupboards	11:00	1412
During air sampling	13:30	638
Grout removal tile	14:00	7500
Cutting ceiling plasterboard	14:10	36,000
Install negative pressure	14:30	1200
Air sampling	15:30	626
Air sampling	17:00	93

Table 5 Infra Red Ambient Air Analyser

Foxboro Miran Sapphire

Chemical investigation	Parts Per Million
Benzene	2
Xylene	2
ET Benzene	2
Toluene	0
Hexane	0.1
HCHO (Formaldehyde)	.63
CO	1
CO ²	80

Note Table 5 is not laboratory confirmation and was for real time site investigation purposes only. The chemicals identified are specifically programmed into the equipment

5.0 Table Interpretation

a. Moisture content

The property shows isolated wet areas and elevated specific humidity in areas where contractors are said to have caused a water leak. The moisture content from the ceiling area inspected is not likely to cause degradation to the timbers which usually occurs at moisture levels over 15% although the floor tiling over a plywood base is at risk at 18%WME³. This is not to say that other ceiling areas are not wetter and mould growth may have occurred over the substantial period the plasterboard and timber has been wet. **See Table 2 section 4**

b. Mould

Although mould growth was not visible at the time of inspection, the growth requirements of temperature, adequate moisture, and cellulose containing materials was present.

The mould analysis is attached in Table 6 section 7 and **annex 3**. It can be seen that low levels of toxic mould (Penicillium/ Aspergillus) is present and although these levels are not seen as very high they may increase over time or result in synergistic effects with other confirmed contaminants.

c. Chlorides

Chloride contamination was measured to assess the acidic residue from the soot produced by the fire. Chlorides are produced from the burning of PVC and result in the formation of chloride deposits which can be activated by the absorption of moisture from humidity, resulting in corrosive and irritant hydrochloric acid.

The samples were taken from areas not previously cleaned during the restoration and re fitting of the kitchen. It is generally accepted that levels over 7 should be investigated further as corrosion may occur. The results of two separate samples show very high levels of chloride contamination and this could be the cause of eye irritation reported and the cause of yellowing generally. **See Table 3 section 4**

d. Specific Humidity

Considering no heating or ventilation was on, the higher than ambient specific humidity in an unoccupied property points to a wet property. From the moisture content readings against EMC⁴ it can be seen that the property requires limited amount of drying out. **Table 1 section 4**

e. Thoracic dust levels

The initial dust levels at 10:30 of 1198 ppm⁵ prior to any works except door opening doors indicates the property is dusty post construction works and requires general cleaning to remove dust and contamination. It can be seen that during air sampling in still air dust levels halved. **Table 4 section 4**

³ Wood Moisture Equivalent

⁴ Equilibrium Moisture content

⁵ Parts Per Million

6.0 Specific Mould sampling

Air Samples- Spore Trap Device

Spore traps are a unique sampling device designed for the rapid collection and analysis of a wide range of airborne particulates, including fungal spores. While analysing the sample, the analyst takes a number of variables into account to select the proper analytical method to accurately determine the densities of the various spores on the trace. The densities of the debris and the spores on the trace will determine the approach to analysing the sample. In general, the sample is directly mounted under the microscope and the various airborne particles detected are counted at a minimum of 200X magnification and up to 1000X magnification, with the entire trace (100% of the sample) being analyzed at 200X or 600X. This method does not differentiate between viable and non-viable fungal spores. This technique does not allow for the differentiation between *Aspergillus* and *Penicillium* spores. Additionally, depending on morphology, other non-distinctive spores are reported in categories such as ascospores or basidiospores. All slides are graded with the following debris scale for data qualification.

Debris Rating	Description	Interpretation
None	No particles detected.	No particulates on slide. The absence of particulates could indicate improper sampling as most air samples typically capture some particles.
<1+	Good visibility. A few particles detected.	Reported values are not affected by debris.
1+	Good visibility. No crowding of particles.	Reported values are not affected by debris.
2+	Decent visibility. Particles beginning to crowd.	Non-microbial particulates can mask the presence of fungal spores. As a result, actual values could be higher than the numbers reported. Higher debris ratings increase the probability of this bias.
3+	Decent visibility. Particles beginning to crowd.	
4+	Poor visibility. Particles beginning to overlap.	Excessive debris detected in the sample. Counts reported may vary drastically and actual values could be higher than the numbers reported. The sample should be collected at a shorter time interval, or other measures taken to reduce the collection of non-microbial debris. In addition, a >4+ rating will only allow for a count from the perimeter of the slide.
>4+	Poor visibility. Particles overlapping.	

Comments

Comments identify issues or events that are relevant to your analytical results. A comment includes information about any peculiar observation or situation encountered while analysing the sample. In each case, the comments provide significant information vital to the interpretation of the laboratory data.

Data Interpretation

According to ACGIH⁶, "Data from individual sampling episodes is often interpreted with respect to baseline data from other environments or the same environment under anticipated low exposure conditions." In the absence of established acceptable exposure limits, it is often necessary to use a comparison standard when interpreting data. In this instance, it will be necessary to sample the suspect area as well as a non-suspect area.

According to ACGIH, "...active fungal growth in indoor environments is inappropriate and may lead to exposure and adverse health effects."

a. Total Fungal Spores

According to ACGIH, "... differences that can detected with manageable sample sizes are likely to be in 10-fold multiplicative steps (e.g., 100 versus 1000...)". Following this logic, if total fungal spores are ten (10) times greater in the sample from a suspect area than in the negative control sample collected from a non-suspect area, then that sample area may be a fungal amplification site.

b. Mycelial Fragments

Mycelium is a fungal mass that constitutes the vegetative or living body of a fungus. Following the same logic above, if total mycelial fragments are ten (10) times greater in the suspect sample than in the negative control, then the sample area is considered to be a fungal amplification site. The presence of mycelial fragments provides evidence of microbial growth.

c. Mycotoxins

Moulds can produce toxic substances called mycotoxins. More than 200 mycotoxins have been identified from common molds, and many more remain to be identified. Some of the molds that are known to produce mycotoxins are commonly found in moisture-damaged buildings. Exposure pathways for mycotoxins can include inhalation, ingestion, or skin contact. Although some mycotoxins are well known to affect humans and have been shown to be responsible for human health effects, for many mycotoxins, little information is available, and in some cases research is ongoing. Some molds can produce several toxins, and some moulds produce mycotoxins only under certain environmental conditions. The presence of mould in a building does not necessarily mean that mycotoxins are present or that they are present in large quantities.

d. Water Indicator Moulds

Certain authorities identify certain molds whose presence indicates excessive moisture. The presence of a few spores of indicator mold should be interpreted with caution. Additionally, it should be recognised that these named moulds are not necessarily the only ones of potential significance

⁶ American Congress Government Industrial Hygienists

7.0 Interpretation Mould Lab Results

The two most important factors of this sampling analysis are;

- **Cladosporium** outside (Column 7 @1300) Base levels

This mould is an indicator of natural degradation of cellulose material and is normal in vegetation and flood damaged homes. The zero and low comparative counts both ambient and negative pressure in the kitchen are therefore not significant.

- **Penicillium /Aspergillus**

This mould n not measurably present outside has been identified within the property. It can be seen that the application of negative pressure to the kitchen area pulled contamination from upstairs or from ceiling void.

Table 6 Total spore analysis

Area	Ambient Pressure	Negative pressure
Kitchen	200	370
Bedroom	570	<33
Landing	<33	300

While these findings cannot rule out the possibility of mould ingress from loft or adjacent properties, the presence of mould in ambient conditions coupled to water loss markers does suggest that growth has occurred.

The flowing results in **Table 7** show infra red gas analysis of chemical presence which are known or expected to be present from the development or presence of mould growth.

Table 7**Infra Red Gas Chromatography for mould analysis****Sample Volume** 42 Liters

	Nanograms Per Liter (ng/L)		Parts Per Billion (ppb)
	Amount Determined	Detection Limit	Amount Determined
Furan	<	0.3	<
2-Methylfuran	<	0.3	<
3-Methylfuran	<	0.3	<
2-Butanone	0.8	0.5	0.3
2-Methyl-1 -propanol	<	0.5	<
2-Methyl-2-butanol	<	0.5	<
3-Methyl-2-butanol	<	0.5	<
2-Pentanol	<	0.5	<
3-Methyl-1 -butanol	<	0.5	<
2-Methyl-1 -butanol	<	0.5	<
1 -Pentanol	0.6	0.5	0.2
2-Hexanone	<	0.5	<
2-Heptanone	<	0.5	<
2-Pentylfuran	<	0.5	<
1 -Octen-3-ol	<	1.2	<
3-Octanone	<	1.2	<
3-Octanol	<	1.2	<
2-Ethyl-1 -hexanol	<	1.2	<
1 -Octanol	<	1.2	<
2-Isopropyl-3-methoxypyrazine	<	1.2	<
Geosmin	<	1.2	<
Total Mold VOCs (TMVOC), ng/L: < 3	< = Not Detected		

It must be stressed that the levels of toxic mould (Penicillium/aspergillus) are not very high but should not be measurably present in a home.

The mould may be due to pre loss conditions but all markers point to water loss incident and it should be recognised that the home has not been heated or moisture loaded to normal living conditions where further growth is possible.

8.0 Air Scan Analysis All results are reported in ng/L

A scan was made for all compounds contained in the attached Air Survey Analysis List **annex 5** Quantitative and Semiquantitative). All compounds detected are listed below: Sample type Still air

Volume 42 liters Sample period 3.5 hours
Date of sample 6/05/09 Analysed 11/05/09

Compound	Calculated Result	Actual Result	Comments
Total VOCs		1,900	Total volatile organic compounds calculated based on internal standard ratio; does not include C1, C2, or methanol
Paint VOCs		33%	This is an estimate of the fraction of Total VOCs represented by the sum of compounds typically associated with paints and varnishes.
Methylene Chloride		1.3	Dichloromethane
Benzene		0.8	ppb 0.4 MW85 CAS 75-09-2 Cyclohexatriene
Toluene		770	ppb 0.2 MW78 CAS 71-43-2 Methyl benzene; Calibrated range exceeded ppb 200 MW92 CAS 108-88-3
Ethylbenzene		11	
m,p-Xylene		23	ppb 2.5 MW106CAS 100-41-4 m,p-Dimethylbenzene
o-Xylene		11	ppb 5.2 MW 106 CAS 106-42-3 o-Dimethylbenzene
n-Propylbenzene		0.7	ppb 2.5 MW 106 CAS 95-47-6
1,3, 5-Trimethylbenzene		0.9	ppb 0.1 MW120CAS 103-65-1 Mesitylene; 1,3, 5-TMB
1,2 ,4-Trimethylbenzene		5.6	ppb 0.2 MW 120 CAS 108-67-8 1,2 ,4-TMB
p-Isopropyltoluene		1.7	ppb 1.1 MW 120 CAS 95-36-3 4-Methyl isopropyl benzene ppb 0.3 MW 134 CAS 99-87-6

Compound	Calculated Result	Actual Result		Comments
1,2,3-Trimethylbenzene		1.3	1,2,3-TMB	
Ethanol	14	7-28	ppb 0.3 Ethyl alcohol ppb 7.5	MW 120 CAS 526-73-8 MW46 CAS 64-17-5
Acetone	5	2-10	2-Propanone ppb 1.9	MW 58 CAS 67-64-1
Pentanal	3	1-6	Valeraldehyde ppb 0.9	MW86 CAS 110-62-3
C7-C9 Hydrocarbon	3	1-6	20.0 min	
C7-C9 Hydrocarbon	5	2-10	20.3 min	
Hexanal	11	5-22	Hexaldehyde; caproic aldehyde	
4-Methyloctane	3	1-6	ppb 2.7 ppb 0.6	MW 100 CAS 66-25-1 MW128CAS 2216-34-4
3-Methyloctane	3	1-6	ppb 0.5	MW128CAS 2216-33-3
C 9	27	13-54	Nonane ppb 5.0	MW128CAS 111-84-2
C8-C10 Hydrocarbon	12	6-24	25.1 min; sum of two overlapping hydrocarbons; one is cyclic	
C8-C10 Hydrocarbon	11	5-22	25.3 min	
Heptanal	8	4-16	Heptaldehyde ppb 1.7	MW114CAS 111-71-7
C8-C10 Hydrocarbon	13	6-26	25.6 min	
Propylcyclohexane	8	4-16	ppb 1.4	MW 126 CAS 1678-92-8
Propylcyclohexane	8	4-16	ppb 1.4	MW 126 CAS 1678-92-8
C9-C11 Hydrocarbon	6	3-12	25.9 min; at least one degree of unsaturation; possibly cyclic	
a-Pinene	10	5-20	2-Pinene ppb 1.8	MW 136 CAS 80-56-8
C9-C11 Hydrocarbon	14	7-28	26.0 min	
C9-C11 Hydrocarbon	16	8-32	26.3 min	

Compound	Calculated Result	Actual Result	Comments
C9-C1 1 Hydrocarbon	14	7-28	26.6min; sumof at lease three overlapping hydrocarbons
m,p-Ethylmethylbenzene	10	5-20	3-and 4 Ethyl toluene CAS Nois for the para Isomer ppb2.0 MW120CAS 622-96 8
C10	87	43-180	Decane ppb 15 MW142 CAS 124 -18 -5
C9-C1 1 Hydrocarbon	21	10-42	27.1 min; at least one degree of unsaturation; possibly cyclic
C9-C1 1 Hydrocarbon	10	5-20	27.2 min; at least one degree of unsaturation; possibly cyclic
Benzaldehyde	6	3-12	ppb 1.4 MW106CAS 100-52-7
Octanal	7	3-14	Caprylic aldehyde ppb 33 1.3 MW128CAS 124-13-0
Limonene	190	95-380	The scan did not differentiate between Limonene (CAS138-86-3) and d-Limonene (CAS 5989-27-5)
C11	10	5-20	Undecane Ppb 1.5 MW 138 CAS91-17-8
Decahydronaphthalene	5	2-10	ppb 0.8 MW138 CAS 91-17-8
Nonanal	10	5-20	ppb 1.8 MW 142 CAS 124-19-6
C12	4	2-8	Dodecane ppe 0.5 MW 170 CAS 112-40-3
Decanal	4	2-8	ppb 0.7 MW 156 CAS 112- 31-2
C14	4	2-8	Tetradecane ppb 0.5 MW 198 CAS 629-59-4
Texanol-B	6	3-12	ppb 0.6 MW 216 CAS 74367-34-3
Hydrocarbon	23	11-46	43.4 min; unsaturated bicyclic C15H24 MW 204

9.0 Negative Air Pressure testing

Note

The following excerpt result has been included for interest purposes only. The negative pressure was applied to draw possible mould contamination from semi permeable cavities. It can be seen that the application of negative pressure created a dilution factor caused by air ingress from substantial air exchanges. No charge was made for this test as it was for data purposes only.

Compound	Calculated Result	Actual Result	Comments
Total VOCs		940	Total volatile organic compounds calculated based on internal standard ratio;
			does not include C1, C2, or methanol
Paint VOCs		36%	This is an estimate of the fraction of Total VOCs represented by the sum of compounds typically associated with paints
			and varnishes.
Methylene Chloride		2.5	Dichloromethane ppb 0.7 MW85 CAS 75-09-2
Benzene		1.0	Cyclohexatriene ppb 0.3 MW78 CAS 71-43-2
Toluene		180	Methyl benzene; Calibrated range exceeded ppb 47 MW92 CAS 108-88-3
Ethylbenzene		3.2	ppb 0.7 MW106CAS 100-41-4
m , p - X y l e n e 7 . 7			m , p - D i m e t h y l b e n z e n e ppb 1.7 MW106CAS 106-42-3
o - X y l e n e 3 . 5			o - D i m e t h y l b e n z e n e ppb 0.8 MW 106 CAS 95-47-6
1,3, 5-Trimethylbenzene		0.5	Mesitylene; 1,3, 5-TMB ppb 0.1 MW 120 CAS 108-67-8
1,2 ,4-Trimethylbenzene		2.3	1,2 ,4-TMB ppb 0.5 MW 120 CAS 95-36-3
1,2 ,3-Trimethylbenzene		0.5	1 ,2,3-TMB ppb 0.1 MW 120 CAS 526-73-8
Ethanol	16	8-32	Ethyl alcohol ppb 8.4 MW46 CAS 64-17-5

10.0 Table 8**Hexane Wipe SVOC Analysis All results are reported in $\mu\text{g}/\text{inch}^2$**

A scan was made for all compounds contained in the attached **section 14**

A control sample was taken of wipes in Spectograph grade Hexane

All compounds detected are listed below:

Sample size 3 square inches

Taken from boiler area under work top

Date sampled 06/05/09

Date analysed 14/05/09

Base compounds $3\mu\text{g}/\text{in}^2$

Semi quantitative compounds $1.5\mu/\text{in}^2$

bis(2-Ethylhexylphthalate)		37	CAS 117-81-7; MW 390
Hexacosane	2.9	1.4-5.8	C26; CAS 630-01-3; MW 366
Heptacosane	5.6	2.8-12	C27; CAS 593-49-7; MW 380
Octacosane	7.9	4.0-16	C28; CAS 630-02-4; MW 394
C27-C29 Hydrocarbon	80	40-160	30.3 min; has at least two degrees of unsaturation; possibly an alcohol
Nonacosane	4.0	2.0-8.0	C29; CAS 630-03-5; MW 408
Triacotane	2.8	1.4-5.6	C30; CAS 638-68-6; MW 422

11.0 TVOC Analysis and comment

Table 9

Home⁽¹⁾	Office⁽¹⁾	
Level ng/L (.tg/m³)	Level ng/L (.tg/m³)	Meaning
Less than 200	Less than 200	Ideal
200-300	200-350	Good
300-400	3 50-500	Acceptable
400-500	500-700	Marginal
More than 500	More than 700	Actionable level; the higher the number, the worse the

Production/Manufacturing^(1,2)	
Level ng/L (.tg/m³)	Meaning
Less than 500	Ideal
500-700	Good
700-1000	Acceptable
1000-1500	Marginal
More than 1500	Actionable level; employee complaints probable;
1500-3000	Exposure effects ⁽³⁾ possible
3000-25000	Exposure effects ⁽³⁾ probable
More than 25000	Toxic range, potential neurological effects

Notes:

1. These levels are applicable to normal individuals; they are not applicable to chemically sensitive individuals.
2. Specific production operations may exceed these levels due to the presence of one or more compounds characteristic of a specific operation. In those cases, it is recommended that OSHA or NIOSH limits be used for those individual compounds and that they not be included in the Total VOC value.
3. Exposure effects – eye and respiratory irritation, headaches, drowsiness, general malaise, etc.

The levels listed in this table and the potential reactions described are based on work done by L. Molhave, (Volatile Organic Compounds, Indoor Air Quality and Health, Vol. 5, International Indoor Air Quality Conference, Toronto, Canada, 1990, p. 22 ff) and others as well as empirical information gained through interactions with many professionals who are active in the IAQ field. These levels should not, in any way, be construed as definitive. Liability for reliance on the data contained in the above tables is therefore disclaimed.

12.0 Conclusions

12.01 The property can be seen to have high levels of dust and soot contamination which is present in obscure areas including kitchen and bedroom sub floor.

12.02 The total levels of VOCs⁷ recorded in section 8 ((1900) is extremely high as can be seen from Table 9 section 11 which show these levels are above those considered a hazard in industrial (production/manufacturing. This level can be expected to cause skin, eye and breathing irritation. These are US standards and generally speaking a level above 500 of VOCs is seen as an actionable level.

12.03 Toxic mould is present although in low levels it should not be present at all.

12.04 The property is still wet and some areas may be at additional risk from mould and rot.

12.05 Many of the compounds recorded are normally expected and may result from :

- Normal background
- Odourants and de odourants or perfume
 - Limonene
 - Benzaldehyde
 - Nonanal
 - Decanal
 - Hexanal

12.06 Specific areas of concern from higher than expected levels:

- Paint
 - Methylene Chloride and solvents (.3-.8)
 - Burning PVC
- Adhesives and silicone type sealers used for plasterboard and tile adhesives:
 - Toluene a known irritant (4-8)

⁷ Volatile Organic Compounds

12.07 SVOC analysis

This identified wax like deposits were present which are commensurate with electrical type fires. Compounds listed in Table 8 section 10 show deposits which can cause irritation including phalates and alcohols. These deposits cannot be removed by usual cleaning and fire restoration products or protocols. (High alkali or surfactants will not remove this type of deposit) and will require specific decontamination protocols.

12.08 Contamination generally

As areas not usually visible can be seen to be dirty and contaminated it must be presumed that proper and competent decontamination prior to redecoration was not undertaken. The application of paint and coverings over contaminated surfaces will not prevent their emergence and discovery in the air but may prevent direct contact sampling. The redecoration therefore can be seen as camouflage only.

12.09 Possible cross contamination

I have expressed concern that a new instrument case I took on site may have caused some elevated levels of Toluene. I have been informed by my laboratory that expected compounds from blown foam within this case would be short chain hydrocarbons and Freon, neither of which were present in the analysis. However in the interest of accuracy I will take additional samples at no cost if required.

12.10 Recommendations

The property should be stripped and decontaminated utilising suitable protocols, where equipment and materials which will encourage both surface and air sanitation are used to ensure satisfactory decontamination of both permeable and non permeable surfaces.

Report Ends

Jeff Charlton
CR-WLS-CMH-AMRT

13.0 Section on compounds analysed for

AIR SURVEY ANALYSES

List of Compounds tested for

Method	Method Detection Limits			
	Quantitative A	Quantitative B	Quantitative C	Semiquantitative
Air Scan	10 ng	5-20 µg	-	5-10 ng

Quantitative List A

Benzene	1,2-Dibromo-3-chloropropane [‡]	1,1-Dichloropropene	Toluene
Bromobenzene	Dibromomethane	1,3-Dichloropropene (cis)	1,2,3-Trichlorobenzene [‡]
Bromochloromethane	1,2-Dibromoethane	1,3-Dichloropropene (trans)	1,2,4-Trichlorobenzene [‡]
Trichlorobenzene [‡]			
Bromodichloromethane	1,2-Dichlorobenzene [‡]	Ethylbenzene	1,1,1-Trichloroethane
Bromoform	1,3-Dichlorobenzene [‡]	Hexachlorobutadiene [‡]	1,1,2-Trichloroethane
n-Butylbenzene [‡]	1,4-Dichlorobenzene [‡]	Isopropylbenzene	Trichloroethene
sec-Butylbenzene	1,1-Dichloroethane	p-Isopropyltoluene	1,2,3-Trichloropropane
tert-Butylbenzene	1,2-Dichloroethane	Methylene Chloride	1,2,4-Trimethylbenzene
Carbon Tetrachloride	1,1-Dichloroethene	Naphthalene [‡]	1,3,5-Trimethylbenzene
Chlorobenzene	1,2-Dichloroethene (cis)	n-Propylbenzene	Vinyl Chloride
Chlorodibromomethane	1,2-Dichloroethene (trans)	Styrene	m & p-Xylene
Chloroform	1,2-Dichloropropane	1,1,1,2-Tetrachloroethane	o-Xylene
2-Chlorotoluene	1,3-Dichloropropane	1,1,2,2-Tetrachloroethane	
4-Chlorotoluene	2,2-Dichloropropane	Tetrachloroethene	

Quantitative List B

Acetaldehyde*	Isopropanol* (2-Propanol)	Methanol	Nitroethane
Acetone* (2-propanone)	Ethyl-3-ethoxypropionate	Methyl acetate*	Nitromethane
Acetonitrile*	Ethyl lactate	Methyl formate	2-Pentanone*
Butadiene*	Ethyl vinyl ether	Methyl vinyl ether	1-Pentene
1-Butanol*	Ethanol*	Methyl vinyl ketone	2-Pentene
2-Butanone* (MEK)	Formaldehyde	3-Methyl-1-butene	Propane
n-Butylacetate*	Furan*	2-Methyl-1-pentene	n-Propanol*
Chlorodifluoromethane*	2-Heptanone*	2-Methyl-2-butene	Propionaldehyde
Cyclohexane*	Isobutane*	4-Methyl-2-pentanone* (MIBK)	Propylene
Cyclohexene*	Isobutyl acetate*	2-Methyl-2-pentene	m-Pyrol
Cyclopentene*	Isobutyl ketone*	4-Methyl-2-pentene	Vinyl acetate*
1,2-Dichlorotetrafluoroethane*	Isobutylene	2-Methylpentane	Vinylidene chloride
1,1-Dimethyl hydrazine	Isoprene	3-Methylpentane	

Quantitative List C

(Tedlar[®] Bag or Canister methods only)

Acetylene	Ethane	Nitric oxide	Silicon tetrafluoride
Ammonia	Ethylene	Nitrogen dioxide	Sulfur dioxide
Boron trichloride	Hexafluoroethane	Nitrogen trifluoride	Sulfur hexafluoride
Boron trifluoride	Hexafluoropropylene	Nitrous acid	Tetrachlorosilane
Carbon dioxide	Hydrobromic acid	Nitrous oxide	1,1,1,2- Tetrafluoroethane
Carbon monoxide	Hydrochloric acid	Pentafluoroethane	Tetramethyl silane
Carbon tetrafluoride	Hydrofluoric acid	Perfluorobutane	Trichlorosilane
Carbon fluoride	Hydrogen cyanide	Perfluoropentane	Trifluoromethane
Diborane	Hydroiodic acid	Perfluoropropane	Tungsten hexafluoride
Dichlorosilane	Methane	Oxygen difluoride	Water
Difluoromethane	Nitric acid	Silane	

Notes

* At levels below the detection limit for Quantitative List B, this compound is reported as part of the Semiquantitative List ‡ Thermal desorption tubes only, compound not available in canister or Tedlar bag

Semiquantitative List

Acetaldehyde	Chloroethane	2,2-Dimethyl-1 -pentanol	Isobutylketone
	Methyl-n-pentyldisulfide		
Acetone (2-Propanone)	3- 2,6-Dimethyl-4-heptanone	Chloro-2-methyl-1-	propene
	Methyl-n-propylsulfide		Isofluorane
Acetonitrile	Chlorobenzaldehyde	(Diisobutyl Ketone)	Isononyl acetate
	3-Methyloctane		
Acetophenone	Chlorodifluoromethane		N,N-
Dimethylcyclohexanamine		Isopropanol	2-Methylpyridine
Acrolein	2-Chloroethylvinylether	1,1 -Dimethylcyclohexane	di-Isopropyl ether
	a-Methylstyrene		
Acrylonitrile	p-Chlorophenol	Dimethylester of	1-Isopulegol
	2-(Methylthio)-butane		
Allyl alcohol(2-propenol)	Chlorotrifluoroethene	pentanedioic acid	Limonene
	Methylthiophene #		
Allyl chloride	Citronellol	1,1 -Dimethylethoxybenzene	Linalool
	1-(Methylthio)-1-propene		
Benzaldehyde	Citronellyl acetate	2,4-Dimethylfuran	Linalool propionate
			MTBE (Methyl tert butyl ether)
2,3-Benzofuran	Citronellyl formate	2,5-Dimethylfuran	Menthol
	Myrcene		
Benzonitrile	o- Cresol	2,3-Dimethylphenol	Mesityl methyl ketone
	Neryl acetate		
Benzothiazole	m-Cresol	2,5-Dimethylphenol	2-(1-Methoxy)propylacetate
	Nicotine		
Benzylalcohol	p-Cresol	2,5-Dimethylpyrazine	2-Methoxy-1 -propanol
	Nonanal		
Benzylchloride	Crotonaldehyde (trans- 2-Nonanone	Dimethylsuccinate	1 -Methoxy-2-propanol
Benzylpropionate	-2-Butenal) 2-Nonenal (trans)	1 ,4-Dioxane	1 -Methoxy-4-(2-propenyl)-
Biphenyl	Cyclohexane	Diphenylether	-benzene
	Octanal		
1 -Borneol	Cyclohexanol	Dodecanal	(Lauryl aldehyde)
	Methoxybenzene	Pentachloroethane	
4- Bromo-1 -butene	Cyclohexanone	1- Dodecanol (Lauryl alcohol)	1-
Methoxycyclohexene	1,3- Pentadiene		
2- Bromo-1 -chloropropane	Cyclohexene	1- Dodecene	2- Methoxyphenol
	Pentamethylheptane		
2- Bromobutane	N- Cyclohexylcyclohexanamine		Epichlorohydrin
	Menthyl acetate	1- Pentanol	
Bromochloroacetonitrile	Cyclopentane	Ethanol	Methyl allyl disulfide
	2-Pentanone		
2-Bromochlorobenzene	Cyclopentanone	4- Ethenyl cyclohexene	a- Methyl benzene
	1- Pentylacetate		

3-Bromochlorobenzene	Cyclopentene 2-Pentylfuran	1-Ethenyl-3-methylbenzene	acetaldehyde	
4-Bromochlorobenzene	Decahydronaphthalene Phenol	Ethoxymethylbenzene	2-Methyl	benzofuran
Bromochlorofluoro	Methane	Decanal	Ethyl	butyrate
Bromodichlorobenzene	1-Methyl decahydro- Diallyl disulfide 3-Phenyl-2-propenal	4-Phenylcyclohexene (4-PCH) 2-Ethyl-1-hexanol	-naphthalene	
Bromoethene (Vinyl Bromide)		Diallyl sulfide	2-Ethyl-1-hexene	2-
Methyl decahydro- Butadiene	a/13-Pinene Diallyl tetrasulfide Propanal	Ethyl 2-methylbutyrate	-naphthalene	
Butanal	Diallyl trisulfide n-Propanol	Ethyl 3-methylbutyrate	Methyl isopropyl ketone	
1-Butanol	2,5-Dibromotoluene Methyl salicylate	2-Ethyl-4-methyl-1,3- 2-Propenyl benzene		dioxolane
2-Butanol	1,1-Dichloro-1-fluoroethane Methyl styrene #	n-Propylacetate	Ethylacetate	
t-Butanol	2,3-Dichloro-1-propene n-Propylamine	Ethylacrylate	Methyl	thiirane
2-Butanone (MEK)	1,4-Dichloro-2-butene (cis) p-Propenylanisole	Ethylbenzoate	3-Methyl-1	H-indole
2-Butenal (trans)	1,4-Dichloro-2-butene (trans)		Ethylcyclohexane	
1-Butoxy-2-propanol	2-Methyl-1,3,5-hexatriene 1,1-Dichloro-2-ethenyl- 2-Propylfuran	Propylcyclohexane Ethylcyclopentane	2-Methyl-1	,3-dioxolane
2-Butoxyethanol	-cyclopropane Pulegone	Ethylmethylacrylate	2-Methyl-1-propene	
2-Butoxyethylacetate	Dichlorodifluoromethane Pyrazine	Eucalyptol	2-Methyl-2,4-pentanediol	
m-tert-Butyl phenol (MIBK)	Dichlorofluoromethane Rose Oxide	Eugenol	4-Methyl-2-pentanone	
n-Butylacetate	1,2-Dichlorotetrafluoroethane		D-Fenchol	1
-Methyl-2-pyrrolidinone		Skatole		
di-n-Butylether	(CFC-114) a-Terpinene	Fenchone	2-Methyl-3-buten-2-ol	
di-t-Butylether	Diethyl disulfide y-Terpinene	Fluorobenzene	4-Methyl-3-penten-2-one	
sec-Butylethylbenzene	Diethyl ether Terpinolene	3-Furaldehyde	6-Methyl-5-hepten-2-one	
2-n-Butylfuran	Diethylbenzene # a-Terpinyl acetate	2-Furaldehyde	Methylacetate	
C 3 (Propane)	N,N-Diethylformamide Tetrahydrofuran	Furan	Methylacrylate	
C 4 (Butane)	Diethylphthalate Thiophene	2-Furanmethanol	Methylbenzoate	
C 5 (Pentane)	1,1-Difluoroethane Tributylamine	Geraniol	2-Methylbutane	

C 6 (Hexane)	2,5- Dihydrofuran Trichlorofluoromethane	Heptanal	2-Methylbutanal
C 7 (Heptane)	Diisopropyldisulfide 1,1,2-Trichloro-1,2,2-trifluoroethane	3-Heptanone	3-Methylbutanal
C 8 (Octane)	1,1- Dimethoxy-2-butene 1,1,1-Trichloro-2-propane	2-Heptanone	Methylbutylbenzene
C 9 (Nonane)	1,1- Dimethoxyheptane Trichlorobenzene #	Heptylbenzene	Methylcyclohexane
C 10 (Decane)	1,1 - Dimethoxyhexane Tricyclene	Hexachloroethane	Methylcyclopentane
C 11 (Undecane)	Dimethoxymethane 1-Methylcyclopentene	1,1,1,3,3,3-Hexafluoro-2-Triethylamine	propanol
C 12 (Dodecane)	1,1- Dimethoxynonane Triethylbenzene #	Hexanal	1-Methylcyclopentene
C 13 (Tridecane)	1,1- Dimethoxyoctane benzene 1,3,5-Triisopropylbenzene	1-Hexanol	bis-(1-Methylethyl)
C 14 (Tetradecane)	1 ,2- Dimethoxypropane ,2,3-Trimethylbenzene	1 -Hexene	1 -Methylethylacetate 1
Camphene	N,N- Dimethyl acetamide Trimethylcyclohexane	3-Hexene	Methylethylbenzene #
Camphor	Dimethyl amine Methylethyldisulfide	4- 3,3,5-Trimethylcyclohexanone	Hydroxy-4-methyl-2-pentanone
Carbon disulfide	N,N- Dimethyl benzenamine Trimethylethylbenzene #	Indene	Methylethylsulfide
Carbontetrabromide Trimethylpentane	Dimethyl disulfide	Indole	2-Methylfuran 2,2,4-
3-Carene	1 ,3-bis(1 ,1 -Dimethylethyl)- Trimethylsilane	Iodomethane	3-Methylhexane
a- Cedrene	-benzene Trimethylsilanol	Isobornylacetate	Methylisothiocyanate
Cedrol	Dimethyl ether Valeraldehyde (Pentanal)	Isobutane	Methylmethacrylate
1 -Chloro-1 ,1 -difluoroethane		2,5-Dimethylpyrazine	Isobutanol (2-Methyl-1-
	2-Methylmethylpropionate	Vinyl acetate	
1- Chloro-1 -fluoroethene	Dimethyl sulfide	-propanol)	1 -Methylnaphthalene
Chloroaniline	Dimethyl trisulfide	Isobutylacetate	2-Methylnaphthalene

isomers of

14.0 Semi Volatile Organic Compounds (SVOC)

Air sample

Method detection limits 200ng/L

12. SVOC (Phenolic)

4-Chloro-3-methylphenol	4-Nitrophenol
2-Chlorophenol	Phenol
m,p-Cresol	2,3,4,6-Tetrachlorophenol
o-Cresol	2,3,5,6-Tetrachlorophenol
2,4-Dichlorophenol	2,4,5-Trichlorophenol
2,4-Dimethylphenol	2,4,6-
Trichlorophenol	
2-Nitrophenol	

SVOC (Non-Phenolic)

Acenaphthene	1,4-Dinitrobenzene
Acenaphthylene	2,4-Dinitrotoluene
Aniline	2,6-Dinitrotoluene
Anthracene	bis (2-Ethylhexyl) phthalate
Azobenzene	bis (2-Ethylhexyl) adipate
Benzo(a)anthracene	Fluoranthene
Benzo(a)pyrene	Fluorene
Benzo(b)fluoranthene	Hexachlorobenzene
Benzo(g,h,i)perylene	Hexachlorobutadiene
Benzo(k)fluoranthene	Hexachloroethane
Benzyl alcohol	Indeno(1,2,3-cd)pyrene
4-Bromophenyl-phenyl ether	Isophorone
Butylbenzylphthalate	2-Methylnaphthalene
di-n-Butylphthalate	1-Methylnaphthalene
Carbazole	Naphthalene
4-Chloroaniline	2-Nitroaniline
bis (2-Chloroisopropyl) ether	3-Nitroaniline
2-Chloronaphthalene	Nitrobenzene
Chrysene	N-Nitrosodiphenylamine
Dibenzo(a,h)anthracene	N-Nitrosodi-N-propylamine
Dibenzofuran	di-n-Octylphthalate
1,3-Dichlorobenzene	Phenanthrene
1,4-Dichlorobenzene	Pyrene
Diethylphthalate	Pyridine
1,2-Dinitrobenzene	1,2,4-
Trichlorobenzene	
1,3-Dinitrobenzene	

15.0 Photo Log

Photo 1

Chloride measurement



Photo 2

Cut hole to ceiling in kitchen to expose joists



Photo 3. Top layer of Plasterboard showing moisture content



Photo 4 Bottom layer plasterboard showing moisture content



Photo 5

WME of plywood floor under ceramic floor tile



Photo 6

Areas where chloride & SVOC tests were taken

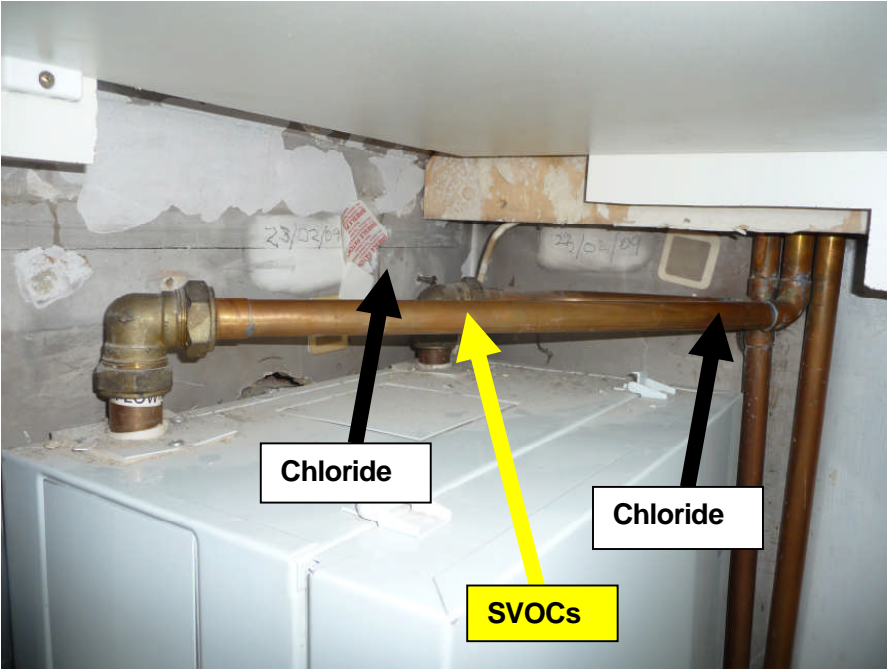


Photo 7

Showing on top of ceiling where leak originated



Photo 8

Installation of Negative Pressure



Photo 9

Grimm dust particulate measurement



Photo 10

Foxboro Miran Air Infra Red analysis



Photo 11

VOC air sampling



BLANK PAGE

