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SURVEY OF THE
MERCURY RESID
COUPLAND BUIL
UNIVERSITY .

Project number – FLIX0010

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CASELLA STANGER

Final Report

SURVEY OF THE PRESENCE OF MERCURY RESIDUES WITHIN THE COUPLAND BUILDING, MANCHESTER UNIVERSITY .

Project number – FLIX0010

CASELLA WINTON

Final Report

SURVEY OF THE PRESENCE OF MERCURY RESIDUES WITHIN THE COUPLAND BUILDING, MANCHESTER UNIVERSITY .

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Client reference

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CONTENTS

1. Introduction

1.1 Manchester University are undertaking a refurbishment of the Coupland Building located on the main Oxford Road campus. During investigations of the sub-floor areas for the presence of asbestos and radio active residues it was noted that there was a significant amount of visible mercury contamination of one particular area. The building has been used for a variety of purposes, including significant use for chemical research, therefore it was determined that there was a probability of further mercury contamination being present throughout the building.

1.2 Manchester University Design Services Group has contracted Casella Winton to undertake a walk round survey to assess the building for the presence of mercury.

2. Monitoring methodology

2.1 Monitoring was undertaken using a real time mercury analyser (Mercury-Instruments Tracker 3000) supplied by Casella CEL Ltd. The unit utilises an ultra violet source with a very narrow wavelength making the unit highly selective for mercury vapour. The unit has a limit of detection of $0.1ug/m^3$.

2.2 Samples of the sub-floor air were taken from a number of points within each room. Where existing floor void access holes were present these were used. In practice however, most of the sub-floor areas were accessed by drilling an 8mm sample hole through the floor boards.

2.3 A number of sample locations were monitored (typically 3 to 4 locations per room) to ensure the survey was representative of the whole room. Where individual samples indicated elevated levels of mercury vapour were present then additional sample locations were investigated to better assess the distribution of mercury vapour in the sub-floor.

2.4 Where results indicated the presence of mercury contamination of the floor boards a sample of the board material was taken. The samples were to the Casella Analytic laboratories and tested for mercury content using Inductively Coupled Plasma Optical Emission Spectrophotometry (ICP-OES).

3. Results

3.1 The results of the testing are Summarised in Table 1.

3.2 The detailed results are presented in Tables 2.1 to 2.24

3.3 The results of the analysis of the floor board samples are presented in table 3.

4. Discussion

4.1.1 The Health and Safety Executive guidance note Environmental Hygiene 40 provides a list of Occupational Exposure (OES) limit values. The current edition is EH40/02 supported by a 2003 supplement. The OES limit value for elemental mercury is $25ug/m^3$ based on an 8-hour exposure time. This value represents a maximum allowable level of exposure within a workplace.

4.1.2 EH 40 is normally revised on an annual basis and is due for a further revision in 2004. The current limit value may be reduced and this should be taken into account when considering the significance of the findings of the survey.

4.2.1 Varying levels of mercury vapour were found throughout the sub-floor areas of the building. The rooms could be categorised as follows

Category A

Severely contaminated - these areas have levels of mercury vapour present in the sub-floor area in excess of the 25ug/m^3 OES limit value and would present a significant health risk to staff working within the sub-floor area. In addition the presence of mercury has the potential to create a long term hazard to staff working in these rooms.

Category B

Significantly contaminated - these areas have levels of mercury vapour present in the sub-floor area between 10 and 25ug/m^3 and has the potential to create a long term hazard to staff working in these rooms.

Category C

Slightly contaminated – these areas have levels of mercury vapour present in the sub-floor area between 1 to 10ug/m^3 and do not present an immediate hazard to staff working in these areas. These levels should present a low risk of long term hazard to staff.

Category D

No contamination – these areas have average levels of mercury vapour present in the sub-floor area of <1ug/m^3 and do not present a hazard to staff.

The main areas of contamination are within rooms 2.52 and 2.52A, 2.62 and 2.63, and G53. The sub-floor areas within room 2.62 where floorboards have been removed contained a significant amount of visible mercury.

4.2.2 The method of categorising detailed in section 4.2.1 would give the following breakdown for the rooms tested as follows.

Risk Category	A(>25)	B(10-25)	C(1-10)	D(<1)
No of Rooms	5	8	12	7

4.3 It is suggested that the following remedial actions are taken with regard to each category of room

Category A Severely contaminated

The floor boards should be removed and the sub-floor area cleaned of all visible mercury residues and other material that may have been contaminated by mercury. The entire sub-floor area should be cleaned and the flooring replaced with new boarding. During this process appropriate PPE including gloves, eye protection and respiratory protection should be used. It is strongly recommended that air monitoring is undertaken during and after these procedures to ensure the removal procedures are not generating a hazardous level of mercury vapour.

Category B) Significantly contaminated

The floor boards should be removed and the sub-floor area cleaned of all visible mercury residues and material that may have been contaminated by mercury. The original flooring should then be replaced. During this process appropriate PPE including gloves, eye protection and respiratory protection should be used. It is strongly recommended that air monitoring is undertaken during and after these procedures to ensure the removal procedures are not generating a hazardous level of mercury vapour.

Category C) Slightly contaminated

Given the reduced risk presented by the lower concentrations of mercury determined, remedial action could involve either cleaning (as category B above) to remove the hazard, or sealing of the floor and subsequent management in the long term to prevent unprotected access to the floor void. Sealing would involve the installation of an impermeable floor cover, sealed at the floor edges. The impermeable cover may be a separate cover where carpet or other gas permeable floor cover is planned or integral where an impermeable lino type cover is planned.

Category D No contamination –

No specific actions are recommended for these areas.

4.4.1 In three instances (room no1.52 location 5 and room 2.53 locations 1 and 7) there was a significant (>25ug/m^3) level of mercury vapour present associated with the wood dust from the sample access hole. Samples of material were taken from these locations, along with a comparison sample taken from room 1.52 location 4. The results of the analysis of the wood dust samples indicate that there are significantly elevated levels of mercury present within the board material in the sample locations compared to the comparison sample. This may indicate that in these rooms there is a likelihood that mercury spillages took place which have left residues either on the surface of the floor boards or within the structure of the boards.

4.4.2 It is suggested that in these two rooms the entire floor is removed and replaced with new flooring.

4.5 It is suggested that once all the remedial works are completed then a survey for ambient levels of mercury vapour are undertaken through out the building prior to occupation.

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TABLE 1.

Summary of monitoring results

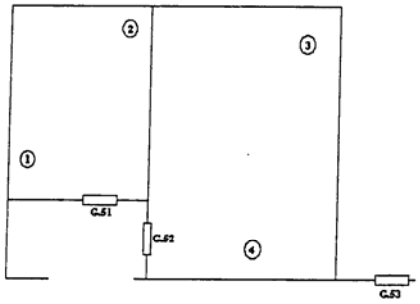
Room number	Background level	Mean sub-floor reading $\mu g/m^3$	Maximum sub-floor reading $\mu g/m^3$	Category
G51	0.1	0.6	0.8	D
G52	0.1	1.0	1.0	D
G53	1.6	111.4	232.6	A
G54	0.5	1.3	1.4	C
(G55)	0.1	20.5	41.2	B
G56	0.2	0.8	0.9	D
postgraduate	1.4	15.7	33.4	B
1.52 (main)	1.9	23.3	43.9	B
1.52 (cupboard)	1.8	7.1	7.1	C
1.52 (kitchen)	0.7	6.0	6.0	C
1.53	1.6	5.8	20.0	B
1.54	0.4	1.9	2.5	C
1.55	0.7	3.0	3.8	C
1.56	1.1	1.3	4.1	C
1.57	0.3	1.2	1.4	C
2.52	10.7	67.0	171.9	A
2.52 (a)	4.9	157.0	230.0	A
2.53 (LHS)	3.3	4.9	7.0	C
2.53 (RHS)	3.9	18.3	35.3	B
2.54	1.0	6.4	6.4	C
2.55	0.4	1.2	1.7	C
2.56	0.3	2.8	3.6	C
2.57	0.7	0.3	0.3	D
2.58	1.0	6.6	17.6	B
2.59	0.3	1.2	1.6	C
2.60	0.4	10.4	19.7	B
(2.61)	0.9	5.5	18.8	B
2.62	6.0	46.0	80.0	A
2.63	4.9	109.2	370	A
2.64	0.6	0.6	1.0	D
beekeepers	0.1	0.2	0.2	D

(room number not indicated on room)

Table 2.1

Room number – G51 & G52

Room diagram

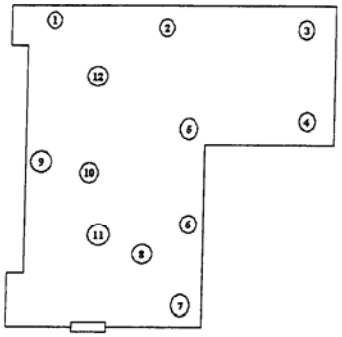


Sample number	Mercury reading	sample description
1	0.5	sub-floor
2	0.9	sub-floor
3	1.0	sub-floor
4	1.1	sub-floor
B/G	0.1	ambient air

Table 2.2

Room number – G53

Room diagram



Sample number	Mercury reading	sample description
1	90.8	sub-floor
2	173.8	sub-floor
3	44.0	sub-floor
4	64.1	sub-floor
5	162.1	sub-floor
6	17.0	sub-floor
7	94.8	sub-floor
8	102.0	sub-floor
9	232.8	sub-floor
10	192.0	sub-floor
11	181.5	sub-floor
12	74.7	sub-floor
B/G	1.6	ambient air

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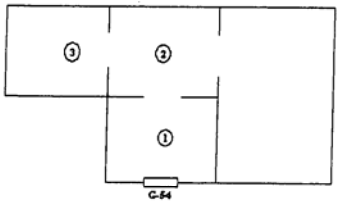
Table 2.3

Room number – G54

Room diagram

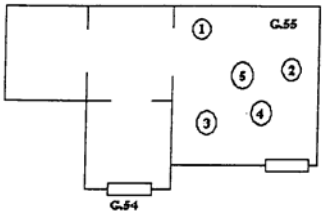


Sample number	Mercury reading	sample description
1	1.2	ambient air
2	1.4	ambient air
3	1.2	ambient air

Table 2.4

Room number – (G55)

Room diagram

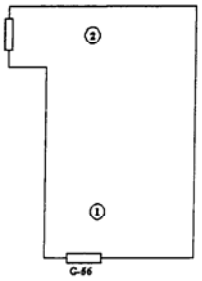


Sample number	Mercury reading	sample description
1	5.1	sub-floor
2	23.0	sub-floor
3	17.6	sub-floor
4	41.2	sub-floor
5	15.4	
B/G	0.1	ambient air

Table 2.5

Room number – G56

Room diagram

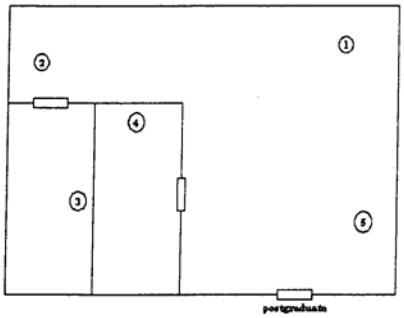


Sample number	Mercury reading	sample description
1	0.8	sub-floor
2	0.7	sub-floor
B/G	0.2	ambient air

Table 2.6

Room number – postgraduate room

Room diagram

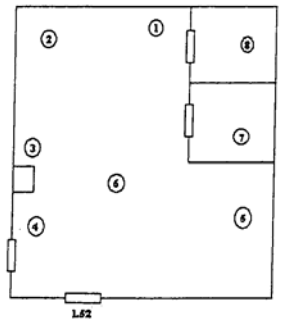


Sample number	Mercury reading	sample description
1	2.0	sub-floor
2	11.3	sub-floor
3	33.4	sub-floor
4	15.1	sub-floor
5	16.7	sub-floor
B/G	1.4	ambient air

Table 2.7

Room number – 1.52

Room diagram

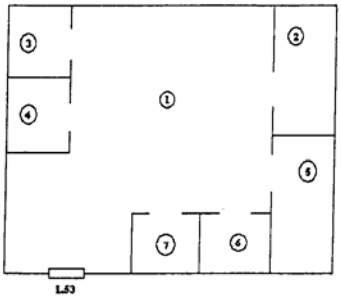


Sample number	Mercury reading	sample description
1	22.4	sub-floor
2	43.9	sub-floor
3	18.9	sub-floor
4 (kitchen)	6.0	sub-floor
5	17.9	sub-floor
6	13.3	sub-floor
7 (cupboard)	7.1	sub-floor
4	4.0	wood shavings
5	95	wood shavings
B/G (1.52)	1.9	ambient air
B/G (cupboard)	1.8	ambient air
B/G (kitchen)	0.7	ambient air

Table 2.8

Room number – 1.53

Room diagram

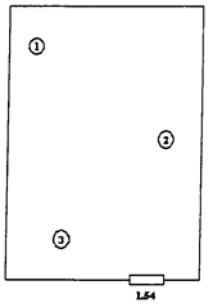


Sample number	Mercury reading	sample description
1	5.2	sub-floor
2	7.3	sub-floor
3	20.0	sub-floor
4	2.4	sub-floor
5	3.0	sub-floor
6	1.4	sub-floor
7	1.5	sub-floor
B/G	1.6	ambient air

Table 2.9

Room number – 1.54

Room diagram



Sample number	Mercury reading	sample description
1	1.4	sub-floor
2	2.5	sub-floor
3	1.9	sub-floor
B/G	0.4	ambient air

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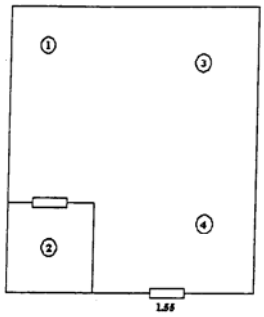
Table 2.10

Room number – 1.55

Room diagram

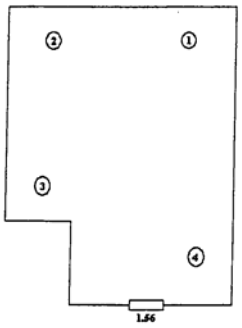


Sample number	Mercury reading	sample description
1	2.8	sub-floor
2	2.5	sub-floor
3	3.8	sub-floor
4	2.9	sub-floor
B/G	0.7	ambient air

Table 2.11

Room number – 1.56

Room diagram



Sample number	Mercury reading	sample description
1	4.1	sub-floor
2	0.2	sub-floor
3	0.3	sub-floor
4	0.7	sub-floor
B/G	1.1	ambient air

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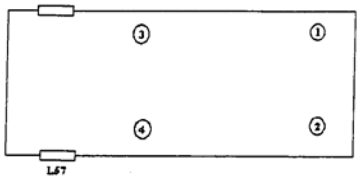
Table 2.12

Room number – 1.57

Room diagram



Sample number	Mercury reading	sample description
1	1.1	sub-floor
2	1.1	sub-floor
3	1.4	sub-floor
4	1.3	sub-floor
B/G	0.3	ambient air

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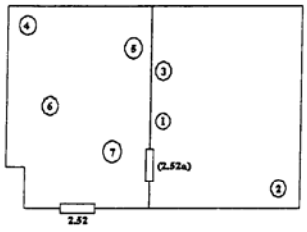
Table 2.13

Room number – 2.52

Room diagram

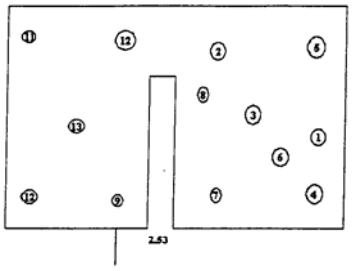


Sample number	Mercury reading	sample description
1	23.3	sub-floor
2	5.9	sub-floor
3	171.9	sub-floor
4	27.0	sub-floor
5	195.9	sub-floor
6	175.9	sub-floor
7	230.0	sub-floor
B/G (2.52)	10.7	ambient air
B/G (2.52A)	4.9	ambient air

Table 2.14

Room number – 2.53

Room diagram

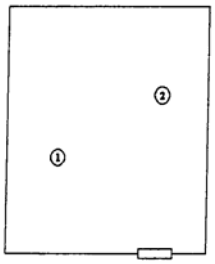


Sample number	Mercury reading	sample description
1	26.5	sub-floor
2	16.6	sub-floor
3	15.4	sub-floor
4	12.6	sub-floor
5	5.6	sub-floor
6	15.9	sub-floor
7	18.3	sub-floor
8	35.3	sub-floor
9	3.9	sub-floor
10	2.7	sub-floor
11	5.5	sub-floor
12	7.0	sub-floor
13	5.5	sub-floor
B/G (left)	3.9	ambient air
B/G (right)	3.3	ambient air

Table 2.15

Room number – 2.54

Room diagram

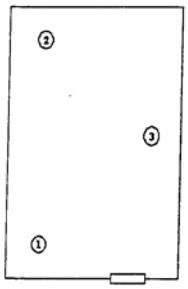


Sample number	Mercury reading	sample description
1	6.4	sub-floor
2	8.1	sub-floor
B/G	1.0	ambient air

Table 2.16

Room number – 2.55

Room diagram

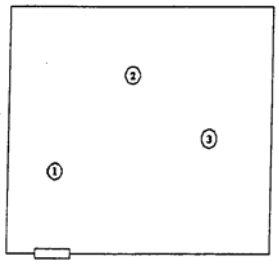


Sample number	Mercury reading	sample description
1	0.8	sub-floor
2	1.7	sub-floor
3	1.0	sub-floor
B/G	0.4	ambient air

Table 2.17

Room number – 2.56

Room diagram

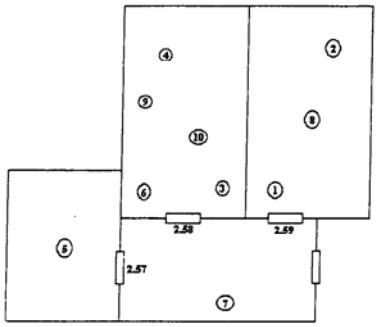


Sample number	Mercury reading	sample description
1	2.0	sub-floor
2	2.7	sub-floor
3	3.6	sub-floor
B/G	0.3	ambient air

Table 2.18

Room number – 2.57, 2.58, 2.59

Room diagram



Sample number	Mercury reading	sample description
1 (2.59)	1.4	sub-floor
2 (2.59)	0.6	sub-floor
3 (2.58)	1.4	sub-floor
4 (2.58)	4.9	sub-floor
5 (2.57)	0.3	sub-floor
6 (2.58)	5.6	sub-floor
7 (corridor)	1.0	sub-floor
8 (2.59)	1.6	sub-floor
9 (2.58)	3.7	sub-floor
10 (2.58)	17.6	sub-floor
B/G (2.57)	0.7	ambient air
B/G (2.58)	1.0	ambient air
B/G (2.59)	0.3	ambient air

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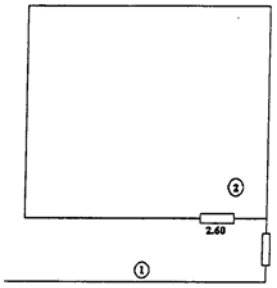
Table 2.19

Room number – 2.60

Room diagram

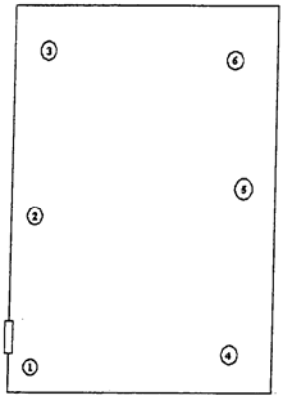


Sample number	Mercury reading	sample description
1	1.1	sub-floor
2	19.7	sub-floor
B/G	0.4	ambient air

Table 2.20

Room number – (2.61)

Room diagram

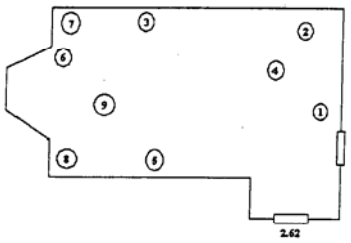


Sample number	Mercury reading	sample description
1	10.8	sub-floor
2	18.8	sub-floor
3	1.2	sub-floor
4	1.2	sub-floor
5	0.6	sub-floor
6	0.5	sub-floor
B/G	0.9	ambient air

Table 2.21

Room number – 2.62

Room diagram



Sample number	Mercury reading	sample description
1	50	sub-floor
2	80	sub-floor
3	68	sub-floor
4	27	sub-floor
5	33	sub-floor
6	77	sub-floor
7	40	sub-floor
8	15	sub-floor
9	27	sub-floor
B/G	6.0	ambient air

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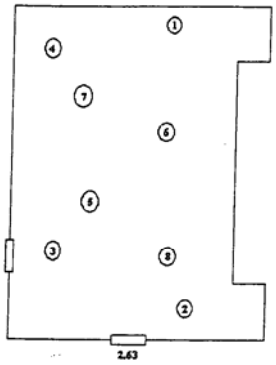
Table 2.22

Room number – 2.63

Room diagram



Sample number	Mercury reading	sample description
1	6.5	sub-floor
2	67.8	sub-floor
3	62.3	sub-floor
4	12.2	sub-floor
5	185.8	sub-floor
6	370.0	sub-floor
7	48.9	sub-floor
8	120.0	sub-floor
B/G	4.9	ambient air

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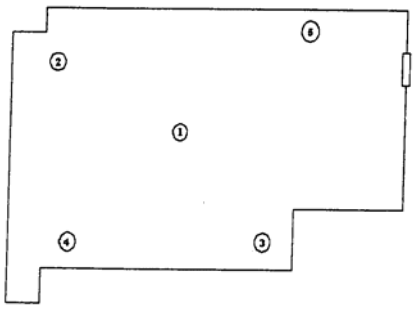
Table 2.23

Room number – 2.64

Room diagram

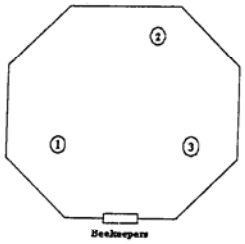


Sample number	Mercury reading	sample description
1	0.6	sub-floor
2	1.0	sub-floor
3	0.8	sub-floor
4	0.4	sub-floor
5	0.3	sub-floor
6	0.5	sub-floor
B/G	0.6	ambient air

Table 2.24

Room number – Beekeepers

Room diagram



Sample number	Mercury reading	sample description
1	0.1	ambient air
2	0.2	ambient air
3	0.2	ambient air
4	0.2	ambient air

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Table 3

Sample number	room number	location	mercury (mg/kg)
1	2.53	1	1340
2	2.53	7	597
3*	2.53	4	4.8*
4	1.52	5	216

* comparison sample from unaffected area