WORKPLACE AIR MONITORING

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Dust
The COSHH definition of a substance hazardous to health includes *"Any kind of dust, if its average concentration in air exceeds the levels specified in COSHH (i.e. >10mgm^{-3} of inhalable dust or 4mgm^{-3} of respirable dust, as time-weighted average exposures over an 8-hour period)"*. This means that any dust will be subject to COSHH if people are exposed above these levels.

However, some dusts have been assigned specific WELs and exposure to these must comply with the appropriate limit.

Inhalable dust approximates to the fraction of airborne material that enters the nose and mouth during breathing and is therefore available for deposition in the respiratory tract.

Respirable dust approximates to the fraction that penetrates to the gas exchange region of the lung.

EH40/2005 *Workplace Exposure Limits*
This HSE document was first published in 2005. This 201 edition replaces the previous version published in 2011. This version takes into account the new limits for substances listed in Directive 2017/164/EU, the fourth Indicative Occupational Exposure Limit Values (IOELV) Directive.

Fume
The word 'fume' is often used to include gases and vapours. This is not the case for exposure limits where 'fume' should normally be applied to solid particles generated by chemical reactions or condensed from the gaseous state, usually after volatilisation from melted substances. The generation of fume is often accompanied by a chemical reaction such as oxidation or thermal breakdown.

Long-term and Short-term Exposure Limits
Effects of exposure to substances hazardous to health vary considerably depending on the nature of the substance and the pattern of exposure.

Long-term Exposure Limit (8-hour TWA)
A long-term exposure limit is concerned with the total intake over long periods and is therefore appropriate for protecting against the effects of long-term exposure or reducing the risks to an insignificant level.

Personal Monitoring
Personal monitoring is used to establish the concentration of an airborne substance within the employee's breathing zone.

Short –term Exposure (15-min TWA)
A short-term exposure limit is aimed primarily at avoiding acute effects, or at least reducing the risk of the occurrence. Specific short term exposure limits are listed for those substances for which there is evidence of a risk of acute effects occurring as a result of brief exposure.

Static Monitoring
Fixed place or static monitoring obtains information on the likely sources contributing to the exposure.

Time Weighted Average (TWA)
A Time Weighted Average is the average exposure over a specified period of time, usually a nominal eight hours.

Vapour
The gaseous form of a material normally encountered in a liquid or solid state at normal room temperature and pressure. Typical examples are solvents, for example, thinners that release vapours when the container is opened.

Workplace Air Monitoring
Exposure measurement assessing employees' exposure to substances in workplace air.

Workplace Exposure Limit (WEL)
Workplace Exposure Limits are intended to prevent excessive exposure to specified hazardous substances by containing exposure below a set level.
A WEL is the maximum concentration of an airborne substance average over a reference period to which employees may be exposed by inhalation.

EXECUTIVE SUMMARY

Michael Dyson Associates Ltd / Adair Tower Block commissioned Environmental Essentials (UK) Ltd to undertake a Workplace Air Monitoring survey relating to specified processes and/or activities carried out at their premises in London.

This survey was undertaken on the 22nd January 2019 to determine concentrations by personal monitoring and background sampling for Respirable Crystalline Silica, Respirable Dust, Total Inhalable Dust, Iron, Manganese, Potassium, Aluminium and Titanium. A total of twelve samples were taken during the survey.

The survey was performed in accordance with Regulation 10 of the COSHH Regulations 2002 (as amended) and does not constitute a written assessment of risk required under Regulation 6 and also in accordance with the guidance provided within HSE document HSG 173 *Monitoring Strategies for Toxic Substances* designed to provide data on the levels of exposure over the duration of a single day. All results reflect conditions prevailing at the time of the survey.

The results of the survey found that all of the samples taken were significantly below the Workplace Exposure Limits. In the case of the most harmful substance, Respirable Crystalline Silica, it was found that the concentrations were not detectable, indicating the control method used to be working well, with exposures not considered to be capable of causing detrimental effects to health through inhalation.

A number of things were noted during the survey that are thought to be relevant and the following recommendations supplied.

- Contact the manufacturer of the reciprocating saw to ensure its suitable for use with a water suppressant control measure.

- Undertake a hand arm vibration assessment of the task to determine the maximum time cutting with the reciprocating saw can be undertaken by each person.

- Should the reciprocating saw be unsuitable for use with water, investigate and apply a suitable on tool extraction system as a replacement.

INTRODUCTION

1.1 Michael Dyson Associates Ltd commissioned Environmental Essentials (UK) Ltd to undertake a Workplace Air Monitoring survey relating to specified processes and/or activities carried out at the Adair tower block in Kensington London.

1.2 Monitoring has been deemed requisite and therefore necessary by the Client with reference to Regulation 10 of the Control of Substances Hazardous to Health Regulations 2002 (as amended) and paragraph 202 of the ACoP given that one or more of the following circumstances apply:

(a) when failure or deterioration of the control measures could result in a serious health effect, either because of the toxicity of the substance or because of the extent of potential exposure, or both;

(b) when measurement is required so as to be sure that a WEL or any self-imposed (in-house) working standard is not exceeded;

(c) as an additional check on the effectiveness of any control measure provided in accordance with regulation 7, and always in the case of the substances or processes specified in Schedule 5;

(d) when any change occurs in the conditions affecting employees' exposure which could mean that adequate control is no longer being maintained, e.g. an increase in the quantity of a substance used or changing systems of work or introducing new plant

1.3 The survey was performed in accordance with the guidance provided within HSE document HSG 173 *Monitoring Strategies for Toxic Substances* designed to provide data on the levels of exposure over the duration of a single day.

1.4 The survey was undertaken by Gary Lisseman of Environmental Essentials (UK) Ltd on 22nd January 2019 and reflects the conditions prevailing at the time of the survey.

OBJECTIVE

2.1 The objective of the survey was to monitor employee exposure to substances and/or determine background airborne concentrations as detailed in Table 1 below:

Table 1

Process Area	Hazardous Substance
Accessing exposure and migration of cutting processes inside the mast climber and on the window ledges in close proximity to the process.	Respirable Dust Respirable Crystalline Silica Total Inhalable Dust Iron, Aluminium, Titanium, Manganese and Potassium

2.2 The results of the survey were compared to current occupational exposure limits as published within HSE document EH40/2005 *Workplace Exposure Limits*. (Third edition, published in 2018).

3.1 Legislation

3.1.1 Exposure to substances hazardous to health is subject to control under the provisions of the Health and Safety at Work Act 1974 which places a duty on every employer to ensure, so far as is reasonably practicable, the health and safety of employees.

3.1.2 With effect from 21 November 2002, the HSW Act was supplemented by the Control of Substances Hazardous to Health Regulations 2002 (as amended).

3.1.3 The eight principles of good practice for the control of exposure to substances hazardous to health are set out in schedule 2A of the Control of Substances Hazardous to Health Regulations 2002 (as amended):

(a) design and operate processes and activities to minimise emission, release and spread of substances hazardous to health;

(b) take into account all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures;

(c) control exposure by measures that are proportionate to the health risk;

(d) choose the most effective and reliable control options which minimise the escape and spread of substances hazardous to health;

(e) where adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable personal protective equipment;

(f) check and review regularly all elements of control measures for their continuing effectiveness;

(g) inform and train all employees on the hazards and risks from the substances with which they work and the use of control measures developed to minimise the risks;

(h) ensure that the introduction of control measures does not increase the overall risk to health and safety.

If employers apply the principles correctly exposure should be below any relevant WEL.

3.2 Workplace Exposure Limits

3.2.1 Current approved workplace exposure limits and associated guidance are provided in EH40/2005. The relevant workplace exposure limits, with reference to EH40/2005, are provided in Table 2 below:

Table 2

Substance	8-hour TWA		15 minute STEL		Comments
	ppm	$mg.m^{-3}$	ppm	$mg.m^{-3}$	
Respirable Crystalline Silica	-	0.1	-	-	-
Respirable Dust	-	4	-	-	-
Total Inhalable Dust	-	10	-	-	-
Iron oxide fume, (as Fe)	-	5[1]	-	10[1]	-
Titanium dioxide, total inhalable	-	10	-	-	-
Aluminium metal, Inhalable dust	-	10	-	-	-
Manganese and its inorganic compounds	-	0.2	-	-	Inhalable fraction
Potassium	Not Listed				-

Note: EH40/2005 recommends that for substances for which no short-term limit is specified, a figure of three times the long-term limit be used as a guideline for controlling short-term elevated exposures.

[1] There is no Workplace Exposure Limit listed for Iron (dust) therefore, for guidance purposes, the WEL for Iron oxide fume has been applied.

Not Listed: The absence of a substances from the list of WELs does not indicate that it is safe. For these substances, exposure should be controlled to a level to which nearly all the working population could be exposed, day after day at work, without any adverse effects on health.

Abbreviations

ppm	Parts per million
$mg.m^{-3}$	Milligrams per cubic metre
WEL	Workplace Exposure Limit
TWA	Time Weighted Average
STEL	Short Term Exposure Limit
COSHH	Control of Substances Hazardous to Health
ACoP	Approved Codes of Practice

3.3 Explanation of Terms

3.3.1 Limits for the hazardous substances measured in this report are published by the HSE in their EH40/2005 document. This is updated periodically and contains the list of Workplace Exposure Limits (WELs) for substances hazardous to health in the air in workplaces. The list of WELs have legal status under the Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended). The WELs should be compared with exposure levels in the workplace, to see whether exposure to the substance by inhalation is being properly controlled.

3.3.2 WELs are set to help protect the health of workers. They are concentrations of hazardous substances in the air, averaged over a specified period of time referred to as a time weighted average (TWA). Two time periods are used, long-term (8 hours) and short-term (15 minutes).

3.3.3 WELs are set on the recommendations of the Health and Safety Commission's (HSC) Advisory Committee on Toxic Substances (ACTS) and its Working Group on the Assessment of Toxic Chemicals (WATCH). Following detailed review and consideration of all relevant information, these committees consider first what level at which the limit should be set.

3.3.4 If exposure to a substance that has a WEL is reduced at least to that level, then adequate control has been achieved. If this level is exceeded, the reason must be identified and measures to reduce exposure to the WEL put into action as soon as is reasonably practicable.

3.3.5 It is recognised that a variety of different patterns of work are used in industry that lead to highly variable concentrations in exposure. A 15-minute reference period, short-term exposure limit (STEL), is typically used to protect against effects that may occur rapidly such as irritation of eyes, nose and/or throat. For substances given a short-term WEL), this level of exposure, averaged over the reference period, should **never** be exceeded.

3.3.6 For certain substances, an additional method of monitoring is through biological monitoring. This can be a useful indicator as to how much of a substance has been absorbed into the body through all routes of exposure. Measurements of substances or their metabolites in blood, urine or exhaled air are commonly used. The adoption of such BMGVs (Biological Monitoring Guidance Values) indicates whether the level of control currently adopted is adequate or whether further control is required. Paragraph 211 of the COSHH ACoP states *"Biological monitoring and biological effect monitoring are useful to assess the degree of exposure and absorption of a substance into the body, particularly whether substances may have entered the body through the skin or via ingestion."*

3.4 Additional Guidance from COSHH ACoP (L5) - Action if a WEL is exceeded

3.4.1 Paragraphs 96 to 98 of the COSHH ACoP provide advice on action if a WEL is exceeded, this advice has been summarised for information purposes below. For full details of the requirements of Regulation 7 please consult the above document.

3.4.2 A WEL should not be exceeded. If it is, the employer should check the continuing effectiveness of the control measures. There may be something obviously wrong which can be corrected. If the reasons for the excessive exposure are not obvious, a more detailed investigation may be needed. This could involve task-based and process related measurements to identify when and why raised exposures are occurring. Employers who are unsure of the implications of results that exceed a WEL, or other exposure standard, should obtain appropriate advice from an expert, such as an occupational hygienist.

3.4.3 If the employer concludes that the air monitoring results do not indicate adequate control of exposure, the further steps to take should include:

(a) checking control measures to ensure that they are working as they should, and for local exhaust ventilation etc that it is performing to design specification;

(b) liaising with managers, safety representatives and employees to establish possible reasons for the rise in the airborne concentration of the substance concerned;

(c) considering whether it is necessary to provide the employees who may be exposed to the substance with suitable Respiratory Protective Equipment (RPE). This should be a temporary measure only until the situation is returned to normal and adequate control of exposure is re-established;

(d) devising and implementing a program of immediate action to reinforce the control measures where a WEL is exceeded and particularly so where the substance concerned is a carcinogen, mutagen or a cause of occupational asthma;

(e) taking further air samples to confirm the concentration of the substance in the air in order to check that any remedial action to tighten control has been effective.

3.4.4 If further air monitoring raises doubts as to whether adequate control is being achieved, the employer should review the assessment to decide whether additional or more stringent controls are needed.

SITE OBSERVATIONS AND COMMENTS

4.1 General

4.1.1 Monitoring was undertaken to assess the exposure during cutting of rendered cladding, prior to the full removal process being undertaken on the Adaire Tower Block.

4.1.2 The reported normal hours of work for the shift monitored were:

- 08:00 to 16:00 hours, with breaks totalling 60 minutes

4.1.3 The monitoring locations were identified by a representative of the Client in conjunction with Environmental Essentials (UK) Ltd as the potential locations of employee exposure to airborne hazardous substances and reference to Regulation 10 of COSHH.

4.2 Observations

4.2.1 During the monitoring period three employees undertook the cutting process, rotating with one cutting, one operating the water suppression and one supervising / resting, cycling between roles every two widths of the building. This was undertaken in this way to try to minimise any problems with hand arm vibration. It should be noted that the operators suggested that following to passes across the building left them with tingling in the hands, suggesting that a Hand Arm Vibration survey should be considered.

Image of the process and water suppression

4.2.2 The water suppression system consisted of a pressurised spray bottle. This required the operator of both the reciprocating saw and the suppression system to work in tandem, which was not always the case depending on how fast they were cutting. The process utilised a large volume of water, which resulted in frequent stoppages to re fill.

4.2.3 Visible particulate had settled on the windowsills below the cutting process, indicating a possible contaminate pathway. Indicated in the below image.

4.2.4 The weather conditions at the time of monitoring were clear, with the wind coming from the opposite side of the building causing limited interference from air currents. It should be noted that changes in wind direction and wind speeds, as well as other weather conditions such as precipitation will have a significant impact on the potential for exposure.

4.2.5 Respiratory Protective Equipment was provided in the form of FFP3 disposable masks. However, not all those provided had been face fit tested and some were bearded, indicating that they will offer a significantly reduced level of protection.

Image showing the poor fitting of the RPE indicated by the visible gap

4.2.6 It was unclear if the reciprocating saw although being 110 Volt was suitable for use with water suppression, as shocks from 110 volt machines can still occur if the tools was not water proof.

4.4 Health Effects

4.4.1 Respirable Crystalline Silica

Respirable Crystalline Silica affects the lungs and the chronic effects are often permanent and disabling. The diseases caused include chronic obstructive pulmonary disease (COPD), lung cancer and silicosis.

Chronic obstructive pulmonary disease (COPD)
COPD is a group of lung diseases, including bronchitis and emphysema, resulting in severe breathlessness, prolonged coughing and chronic disability. It may be caused by breathing in any fine dusts, including Respirable Crystalline Silica. It can be very disabling and is a leading cause of death. Cigarette smoking can make it worse.

Lung Cancer
Heavy and prolonged exposure to Respirable Crystalline Silica can cause lung cancer. When someone already has silicosis, there is an increased risk of lung cancer.

Silicosis
Silicosis is the result of the body's response to the presence of silica dust in the lung. The respirable fraction of the dust, particles generally considered to be smaller than 5µm, can penetrate to the innermost reaches of the respiratory tract. The result is the formation of a scar like patch on the surface of the alveolus. Formation of large numbers of "scars" following prolonged exposure causes the alveolar surface to become less elastic. This reduces the transfer of gases. This is noticed as shortness of breath following exertion. Symptoms seldom develop in less than five years and in many cases may take more than twenty years to become disabling.

There are three major types of silicosis: acute, chronic and accelerated.

Acute silicosis
Acute silicosis develops from inhaling large amounts of silica dust over a few days or months. Signs of the disease include shortness of breath, fever, cough and weight loss. Generally, people with acute silicosis have stable health, however for some it may lead quickly to death.

Chronic silicosis
Chronic silicosis is the most common type and occurs after many years of contact with low levels of silica dust in the air. There are two forms of chronic silicosis: *simple* or *complicated.*

With *simple silicosis*, small solid or unclear nodules can be detected on a chest x-ray, however, individuals are asymptomatic. Long-term exposure to silica dust may lead to complicated silicosis.

With *complicated silicosis*, also called progressive massive fibrosis (PMF), larger nodules can be detected on a chest x-ray. Some individuals may still be asymptomatic or initial symptoms may include shortness of breath with exercise, wheezing or sputum that causes coughing. Other lung diseases can aggravate the condition and severe complicated silicosis can result in heart disease with lung disease, called cor culmonale.

Accelerated silicosis
Accelerated silicosis is similar to the chronic type, however it forms more quickly. The lung scars can be detected sooner and nodules appear on a chest x-ray five years after the first exposure to silica dust. This type of silicosis occurs from exposure to large amounts of silica dust over a short time period and can progress quickly.

4.4.2 **Respirable Dust**

Recent epidemiological research suggests that there may be no threshold below which health effects do not occur. The health effects include:

- toxic effects by absorption of the dust into the blood (e.g. lead, cadmium, zinc);
- allergic or hypersensitivity effects (e.g. some woods, flour grains, chemicals);
- bacterial and fungal infections (from live organisms);
- fibrosis (e.g. asbestos, quartz);
- cancer (e.g. asbestos, chromates);
- irritation of mucous membranes (e.g. acid and alkalis); and
- long-term deleterious effects on lung function causing marginally increased death rates and sickness in sensitive people.

4.4.3 **Total Inhalable Dust**

Although it is recognised that exposure to dust poses a potentially low risk to health the Client should be aware that high concentrations of airborne dust might cause irritation to the respiratory tract thus providing an uncomfortable atmosphere for employees.

There is also the potential that high concentrations of dust might cause mild irritation to the skin and the eyes.

4.4.4 **Aluminium**

The substance can be absorbed into the body by inhalation of its aerosol.

Effects of short-term exposure to inhalation of high concentrations of dust may cause irritation of the eyes and respiratory tract.

Effects of long-term or repeated exposure to the substance may have effects on the central nervous system.

4.4.5 **Manganese**

The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

Effects of short-term exposure may cause mechanical irritation.

The effects of long-term or repeated exposure to the substance may have effects on the lungs and central nervous system. This may result in increased susceptibility to bronchitis; pneumonitis and neurologic and neuropsychiatric disorders.

4.4.6 **Titanium**

There is no known biological role for titanium. There is a detectable amount of titanium in the human body and it has been estimated that we take in about 0.8 mg/day, but most passes through us without being adsorbed. It is not a poisonous metal and the human body can tolerate titanium in large doses.

Elemental titanium and titanium dioxide is of a low order of toxicity. Laboratory animals (rats) exposed to titanium dioxide via inhalation have developed small-localized areas of dark-coloured dust deposits in the lungs. Excessive exposure in humans may result in slight changes in the lungs.

Effects of overexposure to titanium powder: Dust inhalation may cause bronchitis to develop, coughing, phlegm and/or shortness of breath, tightness and pain in chest and difficulty in breathing. Contact with skin or eyes may cause irritation. Routes of entry: Inhalation, skin contact, eye contact.

The IARC (International Agency for Research on Cancer) has classified Titanium Dioxide as Group 2B (Possibly carcinogenic to humans).

4.4.7 **Iron**

A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

Effects of long-term or repeated exposure to the substance may have effects on the lungs. This may result in Siderosis.

SUMMARY OF RESULTS

Results of air monitoring are summarised in Table 3 and 4 below along with the calculations of 8hr TWAs where applicable and do not take into account protection afforded by RPE, unless specified. Regarding the summary of results, the key to the 'RAG system' is as follows:

Results equal to or exceed a WEL (without prejudice to any requirement to reduce exposure to a level that is as low as reasonably practicable)
Results equal to or exceed 50% of a WEL (Environmental Essentials (UK) Ltd classes these as significant)
Results less than 50% of a WEL

Table 3 – Personal Sampling

Sample Ref	Start Time	Operator	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
1	09:53	Daniel Zych	**Cutting Operative**	350	2.0	700	Respirable Dust	0.16	0.23	**0.2**	4
							Respirable Crystalline Silica	<0.01	Below the limit of analytical detection		0.1
2	09:59	Chris Karkpsimah	**Cutting Operative**	344	2.0	688	Respirable Dust	0.26	0.38	**0.33**	4
							Respirable Crystalline Silica	<0.01	Below the limit of analytical detection		0.1
3	10:00	Valintine Jianu	**Team Leader**	343	2.0	686	Respirable Dust	0.19	0.28	**0.25**	4
							Respirable Crystalline Silica	<0.01	Below the limit of analytical detection		0.1

Limit of Detection (LOD) – The limit of detection is defined as the lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

Table 3 – Personal Sampling (Continued)

Sample Ref	Start Time	Operator	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
4	09:53	Daniel Zych	Cutting Operative	350	2.0	700	Total Inhalable Dust	0.17	0.24	**0.21**	10
							Aluminium	<0.001	Below the limit of analytical detection		10
							Titanium	<0.001	Below the limit of analytical detection		10
							Potassium	0.002	0.003	**0.003**	Not Listed
							Iron	<0.001	Below the limit of analytical detection		5[1]
							Manganese	<0.001	Below the limit of analytical detection		0.2

Limit of Detection (LOD) – The limit of detection is defined as the lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

[1] There is no Workplace Exposure Limit listed for Iron (dust) therefore, for guidance purposes, the WEL for Iron oxide fume has been applied.

Not Listed – The absence of a substance from the list of WELs does not indicate that it is safe. For these substances, exposure should be controlled to a level to which nearly all the working population could be exposed, day after day at work, without any adverse effects on health.

Table 3 – Personal Sampling (Continued)

Sample Ref	Start Time	Operator	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
5	09:59	Chris Karkpsimah	**Cutting Operative**	344	2.0	688	Total Inhalable Dust	0.25	0.36	**0.32**	10
							Aluminium	0.004	0.006	**0.005**	10
							Titanium	<0.001	Below the limit of analytical detection		10
							Potassium	0.002	0.003	**0.003**	Not Listed
							Iron	<0.001	Below the limit of analytical detection		5[1]
							Manganese	<0.001	Below the limit of analytical detection		0.2

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									$mg.m^{-3}$	8-Hour TWA	WEL
6	10:00	Valintine Jianu	Team Leader	343	2.0	686	Total Inhalable Dust	0.38	0.55	**0.48**	10
							Aluminium	0.006	0.009	**0.008**	10
							Titanium	<0.001	Below the limit of analytical detection		10
							Potassium	<0.001	Below the limit of analytical detection		Not Listed
							Iron	<0.001	Below the limit of analytical detection		5[1]
							Manganese	<0.001	Below the limit of analytical detection		0.2

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Table 4 – Static Sampling

Sample Ref	Start Time	Static	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
7	10:24	13th Floor	**2nd Window from Right Hand**	310	2.0	620	Respirable Dust	0.4	**0.65**	N/A	4
							Respirable Crystalline Silica	<0.01	Below the limit of analytical detection		0.1
8	10:29	7th Floor	**2nd Window from Right Hand**	309	2.0	618	Respirable Dust	0.15	**0.24**	N/A	4
							Respirable Crystalline Silica	<0.01	Below the limit of analytical detection		0.1
9	10:53	1st Floor	**2nd Window from Right Hand**	308	2.0	616	Respirable Dust	0.3	**0.49**	N/A	4
							Respirable Crystalline Silica	<0.01	Below the limit of analytical detection		0.1

Limit of Detection (LOD) – The limit of detection is defined as the lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

Table 4 – Static Sampling (Continued)

Sample Ref	Start Time	Static	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
10	10:24	13th Floor	13th Floor	310	2.0	620	Total Inhalable Dust	0.22	**0.35**	N/A	10
							Aluminium	0.011	**0.018**	N/A	10
							Titanium	<0.001	Below the limit of analytical detection		10
							Potassium	<0.001	Below the limit of analytical detection		Not Listed
							Iron	<0.001	Below the limit of analytical detection		5[1]
							Manganese	<0.001	Below the limit of analytical detection		0.2

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Table 4 – Static Sampling (Continued)

Sample Ref	Start Time	Static	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
11	10:29	7th Floor	7th Floor	309	2.0	618	Total Inhalable Dust	0.17	0.28	N/A	10
							Aluminium	<0.001	Below the limit of analytical detection		10
							Titanium	<0.001	Below the limit of analytical detection		10
							Potassium	<0.001	Below the limit of analytical detection		Not Listed
							Iron	<0.001	Below the limit of analytical detection		5[1]
							Manganese	<0.001	Below the limit of analytical detection		0.2

Limit of Detection (LOD) – The limit of detection is defined as the lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

[1] There is no Workplace Exposure Limit listed for Iron (dust) therefore, for guidance purposes, the WEL for Iron oxide fume has been applied.

Not Listed – The absence of a substance from the list of WELs does not indicate that it is safe. For these substances, exposure should be controlled to a level to which nearly all the working population could be exposed, day after day at work, without any adverse effects on health.

Table 4 – Static Sampling (Continued)

Sample Ref	Start Time	Static	Process/Location	Duration (mins)	Flow Rate (L/min)	Sampled Volume (L)	Analyte	Mass of Analyte (mg)	Concentration in air ($mg.m^{-3}$)		
									$mg.m^{-3}$	8-Hour TWA	WEL
12	10:33	1st Floor	1st Floor	308	2.0	616	Total Inhalable Dust	<0.05	Below the limit of analytical detection		10
							Aluminium	<0.001	Below the limit of analytical detection		10
							Titanium	<0.001	Below the limit of analytical detection		10
							Potassium	<0.001	Below the limit of analytical detection		Not Listed
							Iron	0.003	0.005	N/A	5[1]
							Manganese	<0.001	Below the limit of analytical detection		0.2

Limit of Detection (LOD) – The limit of detection is defined as the lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

[1] There is no Workplace Exposure Limit listed for Iron (dust) therefore, for guidance purposes, the WEL for Iron oxide fume has been applied.

Not Listed – The absence of a substance from the list of WELs does not indicate that it is safe. For these substances, exposure should be controlled to a level to which nearly all the working population could be exposed, day after day at work, without any adverse effects on health.

DISCUSSION OF RESULTS

6.1 It was reported that this was only representative of half of the removal process, and that during removal operators are likely to only spend 50% of the time undertaking cutting processes.

6.2 Workplace air monitoring results obtained during this study have been compared to the Workplace Exposure Limits (WELs) as detailed in EH40/2005.

6.3 The limit of detection is defined as the lowest quantity or concentration of a component that can be reliably detected with a given analytical method.

6.4 There is no Workplace Exposure Limit listed for Iron (dust) therefore, for guidance purposes, the WEL for Iron oxide fume has been applied.

6.5 The absence of a substance from the list of WELs does not indicate that it is safe. For these substances, exposure should be controlled to a level to which nearly all the working population could be exposed, day after day at work, without any adverse effects on health.

6.6 This survey was carried out in accordance with Regulation 10 of the Control of Substances Hazardous to Health Regulations 2002 (as amended) and does not constitute a written assessment of risk required under Regulation 6.

6.7 All results reflect conditions prevailing at the time of the survey.

6.8 The results for the survey indicate that personal exposure for Respirable Crystalline Silica were significantly below the Workplace Exposure Limit (WEL) of 0.1mg.m^{-3} and in all cases were below the analytical limit of detection.

6.9 The results for the survey indicate that personal exposure for Respirable Dust were significantly below the Workplace Exposure Limit (WEL) of 4mg.m^{-3}.

6.10 The results for the survey indicate that personal exposure for Total Inhalable Dust were significantly below the Workplace Exposure Limit (WEL) of 10mg.m^{-3} and in all cases were below the analytical limit of detection.

6.11 The results for the survey indicate that personal exposure for Aluminium, Iron, Titanium, Potassium and Manganese were significantly below the relevant Workplace Exposure Limits (WELs) and in most cases were below the analytical limit of detection.

6.12 Although results of static sampling cannot be directly compared to Workplace Exposure Limits they have been stated as guidance. All concentrations were found to be significantly below the relevant limits.

CONCLUSIONS

7.1 It is the opinion of Environmental Essentials UK Ltd that exposure to Respirable Crystalline Silica as stipulated within this report were being adequately controlled and airborne concentrations are not considered to be at a level that has a potential to cause detrimental effects to health through inhalation.

7.2 It is the opinion of Environmental Essentials UK Ltd that exposure to Respirable Dust as stipulated within this report were being adequately controlled and airborne concentrations are not considered to be at a level that has a potential to cause detrimental effects to health through inhalation.

7.3 It is the opinion of Environmental Essentials UK Ltd that exposure to Total Inhalable Dust as stipulated within this report were being adequately controlled and airborne concentrations are not considered to be at a level that has a potential to cause detrimental effects to health through inhalation.

7.4 It is the opinion of Environmental Essentials UK Ltd that exposure to Aluminium, Iron, Titanium, Potassium and Manganese as stipulated within this report were being adequately controlled and airborne concentrations are not considered to be at a level that has a potential to cause detrimental effects to health through inhalation.

RECOMMENDATIONS

General

8.1 It should be ensured that all current and new employees who require the use of non-powered respiratory protective equipment (RPE) are firstly subjected to a face fit test to ensure a suitable seal can be achieved. If the RPE chosen is a non-disposable form, regular maintenance should take place to ensure the respirator remains in a suitable condition. Additional guidance on face fit testing can be provided by Environmental Essentials UK Ltd should the Client require.

8.2 In the event that future concerns are raised regarding the level of airborne hazardous substances, it is recommended that a reassessment takes place at the earliest opportunity to ensure that the Control of Substances Hazardous to Health Regulations 2002 (as amended) remain adequately complied with.

Specific

8.3 Contact the manufacturer of the reciprocating saw to ensure its suitable for use with a water suppressant control measure.

8.4 Undertake a hand arm vibration assessment of the task to determine the maximum time cutting with the reciprocating saw can be undertaken by each person.

8.5 Should the reciprocating saw be unsuitable for use with water, investigate and apply a suitable on tool extraction system as a replacement.

REFERENCES

1. Control of Substances Hazardous to Health Regulations (as amended) 2002

2. Health and Safety Executive L5 (sixth edition, published 2013)
   Control of Substances Hazardous to Health
   The Control of Substances Hazardous to Health Regulations 2002 (as amended) Approved Code of Practice and Guidance

3. Health and Safety Executive Guidance Note EH44 (fourth edition)
   Dust in the workplace General principles of protection

4. Health and Safety Executive EH40/2005 (Third edition, published 2018)
   EH40/2005 Workplace Exposure Limits Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations (as amended)

5. Health and Safety Executive HS(G)173 (second edition, published 2006)
   Monitoring strategies for toxic substances

6. Methods for the Determination of Hazardous Substances (MDHS) 14/4, 101/2

7. The National Institute of Occupational Safety and Health (NIOSH)7300

APPENDIX A

SAMPLING AND ANALYTICAL METHODS

RESPIRABLE DUST – MDHS 14/4

Samples for respirable dust were collected by drawing air at 2.2 litres/minute through a pre-weighed Quartz filter paper, housed in a SKC cyclone dust sampling head. The sampling head was connected to a sampling pump with appropriate tubing. For personal monitoring, the sampling head was mounted in the worker's breathing zone, e.g. on his/her lapel. Following exposure the filters were re-weighed.

RESPIRABLE CRYSTALLINE SILICA – MDHS 101/2

Samples for respirable crystalline silica were collected by drawing air at 2.2 litres/minute through a pre-weighed MCE filter paper, housed in a SKC cyclone dust-sampling head. The sampling head was connected to a sampling pump with appropriate tubing. For personal monitoring, the sampling head was mounted in the worker's breathing zone, e.g. on his/her lapel. The concentration was then analysed via X-ray diffraction.

TOTAL INHALABLE DUST – MDHS 14/4

Samples for total inhalable dust were collected by drawing air at 2 litres/minute through a pre-weighed Quartz filter paper, housed in a SKC Total Inhalable Dust-sampling head. The sampling head was connected to a sampling pump with appropriate tubing. For personal monitoring, the sampling head was mounted in the worker's breathing zone, e.g. on his/her lapel. Following exposure the filters were re-weighed.

METALS – NIOSH 7300

Samples for metals were collected by drawing air at 2 litres/minute through a pre-weighed Quartz filter paper, housed in a SKC total inhalable dust sampling head. The sampling head was connected to a sampling pump with appropriate tubing. For personal monitoring, the sampling head was mounted in the worker's breathing zone, e.g. on his/her lapel. Following exposure the filters were analysed via ICP.

APPENDIX B

CERTIFICATES OF COMPETENCY

British Occupational Hygiene Society
Working for a healthier workplace

This is to confirm that

Environmental Essentials UK Ltd

is an Affiliate member of the

British Occupational Hygiene Society

On behalf of BOHS
10 February 2012

This document shows the holder's grade of membership on the date of issue.
Clients wishing to check the holder's current membership status should contact BOHS.

British Occupational Hygiene Society, 5/6 Melbourne Business Court, Millennium Way, Pride Park, Derby, DE24 8LZ.
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Faculty of Occupational Hygiene

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has successfully completed the course

W505 - Control of Hazardous Substances

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