

## Dust Monitoring Protocol for Earthwork Activities at Brownfield Sites

### Aim

To obtain robust activity-based dust generation data to be able to risk-rank different remediation, earthwork and construction activities, and better understand potential fugitive environmental emissions and employee exposures.

### Objective

This protocol is designed to provide a monitoring method by which different activities involving earthworks at brownfield sites can be monitored in a consistent way and the data from each monitoring exercise collated to inform the potential for dust release and the subsequent risk ranking of those activities.

The protocol is designed around the use of dust monitoring on sites that are either are (1) not constrained by dust mitigation measures, such that control measures such as damping down are not necessary and/or can be temporarily withdrawn to enable the monitoring to be carried out (note – this should only be done if the resultant dust levels do not pose an unacceptable risk to health (i.e. are within relevant occupational exposure limits) or nuisance issue off-site), or (2) are subject to mitigation measures and the monitoring can be used to demonstrate the efficacy of these measures.

### Monitoring methodology

The methodology comprises data acquisition on the nature of the activities being monitored, the physical characteristics of the soil, made ground or stockpiled processed construction & demolition materials being disturbed and the airborne dust levels generated by the activities.

### **Key data parameters:**

**Weather** – temperature, wind speed, and rainfall during monitoring

**Soil** – particle size distribution, classification, moisture content, soil/made ground description in general accordance with BS5930/BS EN 1997-2/Eurocode 7

**Activity** – type, frequency, duration, plant used, volume or volumetric rate of soil disturbed/moved during monitoring period

**Ambient dust levels** – peak and average TSP (total suspended particles) PM10 (and if possible) PM2.5 airborne dust concentrations using best practice techniques/methods. The specific type of instrumentation used is not prescribed. It is important that the equipment used is recorded and is used in accordance with relevant best practice. The instrument must be calibrated and capable of detecting dust levels to  $\mu\text{g}/\text{m}^3$  levels.

Options include:

- Hand-held light-scatter monitors
- Air quality sampling device that can sample for PM2.5 and/or PM10
- Coarse dust monitoring ( $>10\mu\text{g}/\text{m}^3$ ) using a passive method (either directional or deposition)
- Real-time continuous logging instruments

Sampler should ideally be listed either by Defra or the Environment Agency as a reference-equivalent instrument (<http://uk-air.defra.gov.uk/networks/monitoring-methods?view=pm-equivalence>), (<http://siraenvironmental.com/UserDocs/mcerts/MCERTSCertifiedProductsCAMS.pdf>), or listed as an 'indicative instrument' (<http://siraenvironmental.com/UserDocs/mcerts/MCERTSCertifiedProductsCAMS.pdf>). Refer to IAQM (2014) guidance for further information

**Occupational dust levels** – inhalable and respirable dust levels using methods that are compatible with workplace exposure limit definitions (e.g. MDHS 14/4).

- Personal monitoring using a standard personal sampling pump and IOM filter head attached to waist belt of selected site operative(s)

**Guide to monitoring approach:**

- Only sample during activity – don't sample during long breaks/downtime in activity
- Specify period over which monitoring was undertaken
- Undertake background monitoring to compare readings to and apply a local correction factor to the results
- For ambient monitoring, monitor dust concentrations at a safe distance from the activity being undertaken. Recommended distance is 10 metres.
- Monitoring point for ambient data should be downwind of the activity

**Record template:**

<b>Description of Site</b>	
General description of site	
<b>Description of activity</b>	
Type	e.g. excavation and stockpiling of soil, or land re-grading/re-profiling
Frequency of event per day	e.g. Continuous, or one earth movement every 15 minutes
Plant being used (type and number)	
Volume or volumetric rate of soil disturbed/moved during monitoring period	metres cubed
Area over which activity is taking place	hectares
Description of any dust suppression measures being used	
<b>Weather Conditions</b>	
Rainfall in previous three days	mm
Air temperature	degrees celcius
Wind speed	metres per second
Rainfall during monitoring period	Description (e.g. light drizzle) and mm precipitation if available
General description of weather	e.g. sunny, overcast etc
<b>Ground conditions</b>	
General description of ground	
Soil classification	In accordance with BS5930, BS EN 1992-2 or Eurocode 7
Particle size distribution	Laboratory test results (including silt/clay fraction)
Moisture content	Laboratory test result
<b>Sampling Approach</b>	
Work Area monitoring	Yes/no
Boundary monitoring	Yes/no
Personal monitoring	Yes/no
<b>Dust Levels</b>	
Ambient dust levels pre-activity (peak and average concentrations)	TSP, PM10 and PM2.5, (or inhalable and respirable fractions)
Dust levels during activity (peak and average concentrations)	TSP, PM10 and PM2.5 (or inhalable and respirable fractions)
Distance of dust monitoring point from activity being monitored	
Duration of monitoring period	
Monitoring instrument used	
<b>Additional relevant information</b>	

**Please send completed templates to: [simon.cole@urs.com](mailto:simon.cole@urs.com)**

## **Airborne Asbestos Fibre Monitoring Protocol for Earthwork Activities at Brownfield Sites**

### Aim

To obtain robust activity-based airborne asbestos fibre generation data to be able to risk-rank different remediation, earthwork and construction activities, and better understand potential fugitive environmental emissions and employee exposures. (Note that it is a requirement under the Control of Asbestos Regulations 2012 (Regulation 19) to monitor airborne fibre levels if it suspected that air concentrations might exceed the control limit of 0.1 f/ml). The expectation is that most activities monitored will not meet this requirement – the purpose of this protocol is not to meet the requirements of Regulation 19.

### Objective

This protocol is designed to provide a monitoring method by which different activities involving earthworks at brownfield sites can be monitored in a consistent way and the data from each monitoring exercise collated to inform the potential for asbestos fibre release and the subsequent risk ranking of those activities.

The protocol is designed to complement the associated protocol for dust monitoring, and should be undertaken in parallel to the dust protocol when possible and where asbestos is suspected to be present in soil, made ground or stockpiled processed construction & demolition materials.

### Monitoring methodology

The methodology comprises data acquisition on the nature of the activities being monitored, the physical characteristics of the material being disturbed and the airborne fibre levels generated by the activities.

#### **Key data parameters:**

**Weather** – temperature, wind speed, and rainfall during monitoring

**Soil** – particle size distribution, classification, moisture content, soil/made ground description in general accordance with BS5930/BS EN 1997-2/Eurocode 7

**Activity** – type, frequency, duration, plant used, volume or volumetric rate of soil disturbed/moved during monitoring period

**Ambient fibre levels** – this requires long-duration, higher flow rate static air sampling to be deployed at a safe and known distance from the area of work. Both upwind and downwind samples will need to be taken to assess the asbestos emissions from the area of the work. Depending on the activity and site conditions downwind filters in particular can become overloaded and the filter deposit will need to be checked and the filter replaced, if necessary. It is suggested that a target of at least 2400

L are collected on 25 mm diameter filters in line with current technical guidance for landfill sector (i.e. five times the minimum recommended sample volume in HSG 248).

<https://www.gov.uk/government/publications/landfill-sector-technical-guidance>

The static sampling and analytical method detailed in HSG 248 can be followed to obtain the phase contrast microscopy (PCM) fibre concentration. However this is a concentration for all fibres and is not specific to asbestos. To allow discrimination of the fibre type to take place it is necessary to retain half of the sampled filter when it is removed from the cassette and mount only a half-filter for PCM fibre counting. The unmounted half-filter should be carefully stored and analysed at a later date to determine the asbestos fibre concentration using analytical electron microscopy (e.g. TEM or SEM).

The strategies and methods that can be used to assess the asbestos fibre concentration are given in MDHS 87. The electron microscopy methods recommended for use are all International Standards (ISO 10312:95 and ISO 14966) for determination of asbestos in ambient air and are used and recognised worldwide. There is also an indirect method for analysing over-loaded filters (ISO 13794:99). Although just EM analysis can be used, laboratory turnaround times may be in the order of 2-5 working days while PCM fibre counting can be carried out on-site and give much quicker results and are considerably cheaper per analysis. For the SEM analysis to comply with the ISO method, it is necessary to use a different filter type ( a track edged gold-coated polycarbonate filter) which is unsuitable for PCM analysis and parallel sampling may be necessary.

**Occupational fibre levels** – respirable fibres in accordance with HSG 248. Note that the analytical laboratory should be requested to report the calculated air concentration as well as the UKAS accredited result.

As a minimum the sampling and analysis should be in general accordance with HSG 248, using PCOM to report airborne fibre concentrations down to 0.01f/ml, but preferably to at least 0.001f/ml.

Analysis should be undertaken using the 1997 World Health Organisation (WHO) recommended method.

**Real-time monitoring** – where possible it would also be useful to understand the shorter temporal variability in airborne concentrations during activities. Real-time monitors are available that can provide supporting information to the ambient and occupational sample filters.

Three such monitors are:

MSP Corp M7000AD

<http://www.mspcorp.com/products-detail.php/aerosol/model-m7400ad-realtime-fiber-monitor>

Harley Scientific FibreCheck FC-3

<http://www.airmet.com.au/userfiles/file/Catalogues/Air-Met%20Catalogue%202012.pdf>

<http://smhproducts.com/>

<http://www.demolitionnews.com/2011/04/27/smh-unveils-uprated-fibrecheck-system/>

ALERT rapid asbestos detection

<http://www.asbestos-alert.com/>

**Guide to monitoring approach:**

- Only sample during activity – don't sample during long breaks/downtime in activity
- Specify period over which monitoring was undertaken
- Undertake background monitoring to compare readings to and apply a local correction factor to the results
- For ambient monitoring, monitor fibre concentrations at a safe distance from the activity being undertaken. Recommended distance is 10 metres.
- Monitoring point for ambient data should be downwind of the activity

**Record template:**

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<b>Sampling Approach</b>	
Work Area monitoring	Yes/no
Boundary monitoring	Yes/no
Personal monitoring	Yes/no
<b>Airborne Fibre Levels</b>	
Ambient fibre levels pre-activity	
Fibre levels during activity	
Distance of fibre monitoring point from activity being monitored	
Duration of monitoring period	
Monitoring instrument used	
<b>Additional relevant information</b>	

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