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dust mitigation measures, such that control measures such as damping down are not necessary and/or can be temporarily withdrawn to enable the monitoring to be carried out (note – this should only be done if the resultant dust levels do not pose an unacceptable risk to health (i.e. are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 µg/m3 levels.

Options include:

- Hand-held light-scatter monitors.

- Air quality sampling device that can sample for PM2.5 and/or PM10.
- Coarse dust monitoring (>10µg/m3) 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:

Description of Site	
General description of site	
Description of activity	
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	
Weather Conditions	
Rainfall in previous three days	mm
Air temperature	degrees Celsius
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
Ground conditions	
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
Sampling Approach	
Work Area monitoring	Yes/no
Boundary monitoring	Yes/no
Personal monitoring	Yes/no
Dust Levels	
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	
Additional relevant information	

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.
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- 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.

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Description of any dust/fibre suppression measures being used	
Weather Conditions	
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Moisture content	Laboratory test result
Sampling Approach	
Work Area monitoring	Yes/no
Boundary monitoring	Yes/no
Personal monitoring	Yes/no
Airborne Fibre Levels	
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	
Additional relevant information	

Limitations

These protocols have been developed by the SoBRA Asbestos-in-soil sub-group. They detail an approach that has developed as a result of discussions between the group members. They are

provided freely on the SoBRA website to help promote discussion on what should constitute good practice in airborne sampling that could be implemented during intrusive work on asbestos-contaminated soil in the UK, and provide consistent methods for data collection that supports an associated sub-group initiative to compile a UK database of air monitoring results for various typical industry activities. Users of these protocols must satisfy themselves that the protocols are appropriate for the intended use and no guarantee of suitability is made.

Feedback

Feedback on these protocols is welcomed and should be submitted to Simon Cole at simon.cole@aecom.com.

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