

Soil Sampling Protocol for Asbestos in Soil

Introduction

This protocol provides a draft outline of a potential sampling approach developed by the SoBRA Asbestos-in-soil sub-group. It aims to strike a balance between traditional soil survey sampling strategies and soil sampling strategies designed specifically for known asbestos containing soil, made ground and aggregate. An adopted sampling protocol should always provide sufficient assurance that asbestos, if present, has been representatively sampled, as this protocol should be adapted according to site-specific conditions and sampling objectives.

The protocol deals only with the technical aspects of soil sampling and does not detail necessary considerations such as those for health and safety, which must be considered in the application of the protocol.

Sample Collection

In order to be able to adequately describe ground conditions, provide a sufficiently large sample for subsequent laboratory analysis, and target surface soil, it is suggested that an area of soil 0.5m x 0.5m is first cleared of all vegetation (if present). Prior to sampling the area should be damped down to control dust (and potential asbestos fibre) emission.

Vegetation clearance, if required, should be undertaken using hand-tools, not power tools. This should focus on above ground vegetation clearance and very limited root zone clearance only if a root mat exists that prevents soil sampling.

Depth of sampling needs to be determined by the sampling strategy.

The soil from the prepared sampling area, including all stones, etc., natural or otherwise, should then be placed in a large plastic tray for visual inspection. This might require discrete soil layers to be sampled in sequence to control the volume of soil being inspected at any one time.

All suspected ACM fragments observed in the soil should be picked out by hand and placed together in clean plastic tubs with snap tops and the sides and tops of the tubs clearly annotated with a unique sample reference number and the sampling date. These samples will need to be submitted along with the soil samples for separate laboratory analysis. A separate record should be made of the types of suspected ACM fragments present; cement, insulating board, vinyl tile, string, compressed gasket etc.

A record should also be made of the presence of any visible fibres and/or bundles of fibres in the soil.

If ACM fragments are identified and sampled for laboratory confirmation of asbestos content, the entire soil sample in the tray should be weighed using calibrated scales so that the extracted mass of ACM can be related back to the original soil sample.

Once suspected ACM fragments have been hand-picked, the remaining soil should be coned and quartered to provide an approximate 1litre soil sample for shipment to the laboratory. Samples should be placed in clean plastic tubs with snap tops and the sides and tops of the tubs clearly

annotated with a unique sample reference number and the sampling date. Duplicate samples should be taken as per the agreed survey design.

The plastic tray shall be decontaminated after each sample using disposable damp cloths and clean water rinse. If asbestos has been identified in the sample, the cloths should be bagged and disposed of as asbestos waste.

Arisings shall be re-deposited in the hole and any subsequent void filled with commercial bagged topsoil. Vegetation should be replaced if practicable (e.g. turf).

This sampling collection approach is applicable to stockpile sampling as well as ground sampling.

Sampling method

Use a stainless steel trowel or small spade - trowel/spade to be decontaminated after each sample or sub-sample using disposable damp cloths.

Sample locations should be selected based on the agreed survey strategy and should avoid land likely to be affected by asbestos waste. However, each sample location and its surrounding areas should be inspected prior to sampling and any indication of potential asbestos contamination noted. If at any time asbestos is suspected, measures should be taken to control airborne fibre release, and the spread of asbestos on equipment and clothing.

Sample Record

1. Ground conditions to be logged in accordance with BS5930.
2. High resolution photographs to be taken of sample excavation, and of excavated soil at each location.
3. Recording of visual identification of visible suspected ACM fragments and fibres/fibre bundles (if present) in accordance with pre-agreed photographic reference sheet.
4. Description of immediately surrounding land-use / condition.
5. Grid reference or other agreed method for sample identification and location.

Alternative sample collection methods

This protocol does not prescribe a singular collection method. The emphasis is on designing/adopting a sampling approach that maximises the representativeness of the sample to the bulk material being sampled whilst recognising the practical constraints of soil sampling.

Two alternative sample sizes have been identified dependent on whether the asbestos contamination constitutes ACM fragments and/or dispersed fibres:

- A 10 litre sample is proposed if sampling is targeting discrete, scattered ACM fragments in soil
- A composite 1 litre sample is proposed where only dispersed fibres are expected.

If the 10 litre sampling option is chosen, and if practicable and suitably trained staff are available, each sample should be carefully placed out on a disposable plastic sheet or tray and the soil should be carefully picked through and identifiable pieces of ACM segregated into a separate sample container for subsequent laboratory identification and gravimetric analysis¹. A descriptive record should be kept of the number and sizes of fragments of ACM picked out. This record should use a pre-formatted field record sheet that harmonises the size categories in which the ACM fragments are counted (for example <math><1\text{cm}^2</math>, <math>>1<4\text{cm}^2</math>, <math>>4<10\text{cm}^2</math>, $>10\text{cm}^2$).

Once all visible pieces of ACM have been removed and placed in the separate sample container, a 1 litre composite sample of the remaining soil should be taken for subsequent laboratory analysis.

There are a number of ways in which composite/ incremental / cluster samples can be taken and this alternative protocol does not single out one method in preference to others. Approaches developed for sampling of explosives in soil, which commonly exhibit similarly discrete, spatially heterogeneous distributions in soil may be appropriate.

Additional considerations

If we are interested in the risks to human health from asbestos in soils should we target the soil depths that have:

1. been potentially impacted by asbestos and / or
2. pose risks to health in various scenarios through the potential to generate airborne fibres (and which subsequent activity based sampling might also tie in with).

1. The processes that result in asbestos being in soil could be viewed as surface deposition of various kinds, mixed soils with asbestos in as a result of demolition / wastes, made ground etc. and the subsequent mixing of these soils over time by various other processes. This might be illustrated as per the table below:

	Process	Soil strata impacted initially	Soil strata impacted over time (say over 20 years) – redistribution of asbestos?	Soil strata impacted with human disturbance (from digging your garden to ploughing to building / civil works etc.)
1	Deposition of fibre from air	Surface	0-10cm bgl	Potentially all, and for practical purposes here, 0-50cm bgl
2	Presence from erosion processes forming soils in	Potentially all, and for practical purposes here, 0-	Same - potentially all, and for practical purposes here, 0-	Same - potentially all, and for practical purposes here, 0-50cm bgl

¹ An acceptable alternative is for the sample to be double bagged, labelled in accordance with HSE guidelines and sent to a suitably accredited laboratory with appropriately trained staff for subsequent sample preparation as described.

	areas with natural asbestos	50cm bgl	50cm bgl	
3	Leaching (both upwards and downwards) of fibre and small debris	+ or – up to 10cm from where it started	same	same
4	Deposition of ACMs / debris to soil surfaces i.e. natural or undisturbed ground	surface	0-10cm bgl?	Potentially all, and for practical purposes here, 0-50cm bgl
5	Deposition of soils / waste containing ACMs / debris in a mixed form already i.e. made ground	Potentially all, and for practical purposes here, 0-50cm bgl	Same - potentially all, and for practical purposes here, 0-50cm bgl	Same - potentially all, and for practical purposes here, 0-50cm bgl

2. The processes that expose people to asbestos i.e. generation of airborne fibre by direct exposure are:

- surface disturbance – kids playing football is a typical ‘activity’ example used
- disturbance of deeper soils by gardening, hand digging etc. –up to 50cm deep
- mechanical disturbance – ploughing, civil works, building works etc.

(This does not capture secondary exposure i.e. transport of any of the above to other areas (on tools, machines, boots, wheels etc.) where it dries out and becomes surface dust – in sheds, houses, decontamination units, changing areas, plant yards, roads etc.

To establish where the asbestos is at source, sample in relation to how it got there and how it gets back out again i.e. risk. This might mean taking say 2 or 3 samples from any one location:

- 0-5 cm bgl, to reflect surface deposition and ‘immediate’ risks from surface activity disturbance
- 5-30cm bgl to reflect ACM in soils mixed from surface deposition and the risks from shallow disturbance (when combined with 1)
- >30cm bgl to reflect mixed soils / made ground / waste deposits and risks from deeper / mechanical disturbance (when combined with 1 and 2)

Limitations

This protocol has been developed by the SoBRA Asbestos-in-soil sub-group. It details an approach to soil sampling when asbestos is a contaminant of concern that has developed as a result of discussions between the group members. It is provided freely on the SoBRA website to help promote discussion on what should constitute good practice in sampling asbestos-contaminated soil in the UK. Users of this protocol must satisfy themselves that the protocol is appropriate for the intended use and no guarantee of suitability is made.

Feedback

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

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