



JIWG

Joint Industry Working Group

Asbestos in Soil and Construction & Demolition Materials

ASSESSMENT AND CONTROL OF ASBESTOS RISK IN SOIL

PART 2: PROTECTION OF PERSONNEL
WORKING IN GEOTECHNICAL
AND GEOENVIRONMENTAL LABORATORIES

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EXECUTIVE SUMMARY

All employers have a duty to provide a safe working environment for their employees. The business of ground investigation is inherently one of discovery, and accordingly there is a possibility of encountering the unexpected, including soils which contain asbestos containing materials (ACMs), as visible fragments and/or microscopic fibres. This over-arching legal obligation prompts employers to assess and manage potential risks related to hazardous materials, including ACM.

Ground investigation is only occasionally carried out with the specific purpose of assessing the presence and impact of asbestos in soils. For many ground investigations, the principal aim is to obtain geotechnical, utilities, foundation or similar information. Even for ground investigations involving contamination, typically, ACMs will be one of many contaminants of potential concern in the soils being investigated and assessed. In such cases the investigation will be subject to particular regulatory requirements, the Control of Asbestos Regulations (CAR 2012).

However, whatever the aims and objectives, the soils on a site subject to investigation might be contaminated by asbestos (and other contaminants) because of the previous uses of, or activities on, the land. Ground investigation on such sites normally involves the disturbance, sampling and laboratory testing of Made Ground soils. These activities have the potential to expose workers to soil containing asbestos. If asbestos containing materials are present in the Made Ground, the potential for exposure to airborne asbestos during ground investigation will depend upon several factors, such as; location, extent (i.e. widespread or sporadic), amount (i.e. trace concentrations or otherwise), form and condition, how it is bound, how moist the ground is, the nature of the work. Those planning and undertaking those investigations must adequately address all of these factors when carrying out their risk assessment in both the planning and execution stages.

Some ground investigations will not encounter Made Ground, and as discussed above, in many cases Made Ground investigation will be a small part of an overall investigation scope. However, ground investigation activities increase the possibility of exposure to asbestos if it is present in the soils and able to be mobilised. This is particularly the case for workers who for example sample, log, prepare and test samples of Made Ground. Nevertheless, where ground investigations are undertaken at sites where there is no recorded evidence of asbestos in soils, or on sites where there is minimal concern arising from previous land use but the site is still considered to pose a risk from asbestos on or in the ground, then those planning and undertaking those investigations must adequately address those risks in the planning and execution stages.

This guidance is split into two parts; Part 1 provides information on the assessment and control of asbestos risk in soil for the protection of personnel working on ground investigations and Part 2 provides information for the protection of personnel working in laboratories associated with testing samples obtained from those investigations.

Although every effort has been made to check the accuracy of the information and validity of the guidance given in this document, neither the members of the AGS Working Groups, nor the AGS accept any responsibility for mis-statements contained herein or misunderstanding arising here from

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Part 1 Protection of personnel working on ground investigations

Abbreviations and acronyms

AAT	Asbestos Awareness Training
ACM(s)	Asbestos-Containing Material(s)
ACOP	Approved Code of Practice
AGS	Association of Geotechnical & Geoenvironmental Specialists
AIB	Asbestos Insulating Board
APF	Assigned Protection Factor
BOHS	British Occupational Hygiene Society
BS	British Standard
CAR 2012	Control of Asbestos Regulations 2012
CAR-SOIL	CL:AIRE (2016). Control of Asbestos Regulations 2012 Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials Industry Guidance
CDM 2015	Construction (Design and Management) Regulations 2015
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
DCU	Decontamination Unit
DST	Decision Support Tool
EA	Environment Agency
FFP3	Filtering Facepiece with P3 high-efficiency particle filtration
HSE	Health and Safety Executive
HSENI	Health and Safety Executive for Northern Ireland
LARC	Licensed Asbestos Removal Contractor
LW	Licensable Work
NLW	Non-Licensable Work
NNLW	Notifiable Non-Licensable Work
NRW	Natural Resources Wales
PACM	Presumed Asbestos-Containing Material
PPE	Personal Protective Equipment
RPE	Respiratory Protective Equipment
SALI	Sporadic and of Low Intensity
SCA	Standing Committee of Analysts
SEPA	Scottish Environmental Protection Agency
STEL	Short Term Exposure Limit
TNA	Training Needs Analysis
UKAS	United Kingdom Accreditation Service

Glossary

Desk Study	Office-based collation of historical and current records about a site including maps, photos, previous intrusive investigations, geology, hydrogeology, hydrology etc to inform a ground model or a conceptual site model. This is the Desk Study part of BS 5930 term “Phase 1” and is the Desk Study part of BS 10175 “preliminary investigation”.
Made Ground	From BS 5930 “anthropogenic ground in which the material has been placed without engineering control and/or manufactured by man in some way, such as through crushing or washing, or arising from an industrial process”.
Engineered Fill	From BS 5930 “anthropogenic ground in which the material has been selected, placed and compacted in accordance with an engineering specification”.
Ground Investigation	The wider sense of investigation of the site, which includes desk studies, site walkovers, utilities surveys and intrusive field and laboratory work.

1.0 Introduction

Laboratory testing associated with ground investigation is not always carried out with the specific purpose of assessing the presence of asbestos in Made Ground on and/or beneath the surface of a site. Where asbestos testing or analysis has been identified and specified, it would be expected that the chosen laboratory, whether that be a geotechnical or geoenvironmental laboratory, has robust procedures in place to manage samples contaminated or potentially contaminated with asbestos and to protect their personnel.

Part 1 of this guidance has indicated that potentially 80% to 90% of the United Kingdom's brownfield sites might be contaminated to a degree by asbestos (British Standard BS 10175:2011+A2:2017) due to dumping of wastes, demolition, and import of recycled fill materials and aggregates used in earthworks and capping layers, landscaping, noise bunds, piling mats etc. It also suggests that available desk studies may provide little or no information with regard to the presence, or otherwise, of asbestos on and/or in the ground. It is, therefore, possible that laboratory testing on many sites with Made Ground might contain samples with asbestos.

Laboratories should bear in mind that many preliminary ground investigations are not directed at the potential contamination of a site or specifically designed to investigate the presence, or otherwise, of asbestos as their principal aim is to obtain geotechnical information for engineering purposes such as design of foundations, structures, etc and any subsequent laboratory testing is therefore focussed on these aims. Low levels of asbestos have also been found in marine sediment and therefore laboratories should have suitable and sufficient procedures to assess the presence or otherwise of asbestos within samples prior to testing, especially including those from ports, docks and harbours, as well as near-coastal areas with a history of heavy industry and or landfilling. This guidance aims to assist this process to protect personnel working within these laboratories.

2.0 Work with asbestos

Many ground investigations require laboratory testing of samples from sites containing Made Ground, and in doing so they must be cognisant that there is a possibility that preparation and testing of samples may expose laboratory personnel to soil or Made Ground containing asbestos in some form. When soils and Made Ground that contain asbestos are sub-sampled, prepared and tested, significant quantities of respirable asbestos fibres may be released into the air, depending on a number of factors such as the amount of asbestos present, the form that the asbestos takes, the condition of the asbestos, how the asbestos fibres are bound (or not) in the sample, how moist the sample is, and the nature of the test. If asbestos fibres are mobilised, and if they are then inhaled, they can cause fatal and serious diseases.

As indicated in Part 1 of this guidance, work which disturbs asbestos fibres or asbestos containing materials (ACMs) and could result in the release of significant quantities of respirable asbestos fibres will be classified under CAR 2012 as 'working with' asbestos. Therefore, any works which involve sub-sampling, sample preparation and analysis of samples to determine the presence of asbestos should be carried out in such a way that disturbance to asbestos/ACMs is minimal. Work with Made Ground including handling and analysis of samples in the laboratory must minimise disturbance and therefore minimise the potential for asbestos fibres to become airborne or to unwittingly spread asbestos and ACM.

3.0 Laboratory Management

3.1 Risk Assessment and Plan of Work

Part 1 of this guidance explains that CAR 2012 requires that an asbestos Risk Assessment and Plan of Work must be in place to control the risk to employees from exposure to asbestos.

Therefore, all geoenvironmental and geotechnical laboratories must have procedures and a suitable and sufficient asbestos Risk Assessment in place to protect their staff from possible exposure to asbestos. It is the experience of AGS members that the controls present in analytical geoenvironmental laboratories may not be present in some geotechnical laboratories. Whereas the awareness of asbestos risk may be heightened in a laboratory that is equipped for the identification of asbestos, this may not be the case in a geotechnical laboratory. Whilst the typical sample size handled by environmental labs will be around 1 kg, geotechnical testing will normally require a significantly larger mass of soil, potentially increasing the risk if asbestos/ACMs are present.

The deliberate drying, crushing, or sieving of samples in a laboratory must be recognised as possibly the highest risk of all activities associated with laboratory analysis where there is a high likelihood of asbestos being present. There is a high probability in these circumstances that significant quantities of respirable asbestos fibres may be released in close proximity to personnel and into the laboratory workspace.

The laboratory design and working procedures must either be wholly protective based upon an assumption of asbestos being present in the samples or have a secure method of only releasing samples into a conventional soils laboratory environment once these have been assessed as not being at risk of containing asbestos.

It is good practice for the laboratory to be notified in advance if asbestos and/or ACMs are suspected to be present in a sample.

Part 1 of this guidance explains the sampling procedure on ground investigations with known asbestos and how these samples should be taken, protected and clearly labelled e.g. small disturbed samples placed in tubs and the tubs placed into self-sealing polythene bags and large bulk samples double bagged and each bag being 'swan-necked'. If samples are delivered which do not follow this procedure, the laboratories should consider in their management plan suitable control measures i.e. refusal of the delivery or placing the samples in a suitable quarantine facility.

3.2 Training

All laboratory personnel likely to have potential contact with soil samples containing asbestos must receive appropriate training. Where known asbestos or evidence suggests that samples are highly likely to contain asbestos, the laboratory personnel sub-sampling, preparing and testing these samples should have attended an appropriate Asbestos Awareness training course and have undertaken additional Non-Licensed Work with asbestos in soil training.

Asbestos Awareness training is not enough if you plan to carry out any laboratory testing on samples with asbestos or suspected asbestos.

The British Occupational Health Society (BOHS) run specific training courses to help with sampling and identification of asbestos including P408 Identification and quantification of asbestos in soils and P409 Strategies and sampling of soils for asbestos.

3.3 Sample handling and screening

The revised HSG 248 (publication due 2021) Appendix 2 Determination of asbestos in bulk materials details the basic procedure for all types of samples with further guidance for soil samples in Appendix 7.

Handling procedures should be such as to minimise the risk of releasing fibres into the laboratory:

- Visual and stereomicroscope examinations, and sample preparation, must be conducted inside a fume cupboard, or in a suitable cabinet.

- Sealed bags or containers of asbestos samples should only be opened inside such a cabinet or fume cupboard. Heavy-duty plastic bags are recommended for temporary containment of waste prior to final disposal in correctly labelled bags.
- When ACMs are handled frequently, airborne exposures should be assessed as required by CAR 2012 and the results recorded and made available to the analysts. In any case, representative personal air monitoring should be conducted on selected analysts on a periodic basis, in the sample preparation/identification area.
- Emergency and spillage containment procedures must be documented and implemented as required.
- Chemicals used in sample preparation are subject to the COSHH Regulations and should be fully assessed prior to use and handled in fume cupboards as appropriate.
- Fume cabinets must conform to BS EN 14175 (2003) and should have a minimum face velocity of 0.5m/s over the working area.
- Recirculating air cabinets must conform to BS 7989 (2001) and draw air away from the analyst and pass through a high efficiency filter (a type H12 filter (99.5% efficient at 0.3 µm) or higher).
- A Class H vacuum cleaner is also recommended for emergency clean up and cleaning up spills inside the cabinet.

Most geotechnical laboratories do not have the capability to identify whether a sample contains asbestos. If this is the case, it will be necessary to store all suspect samples in a safe quarantine area and to send suspected asbestos samples to a UKAS-accredited analytical laboratory for asbestos screening.

Following asbestos screening results the samples or sub-samples may be assessed and deemed to be clear of asbestos and the samples and the materials can be moved away from the quarantined area and geotechnical testing can proceed. Alternatively, if the geotechnical parameter testing is required, there are now a small number of UK laboratories which undertake geotechnical testing on samples of Made Ground which contain asbestos. This is usually called “red lab” testing.

3.4 Laboratory Health and Safety Requirements

Geoenvironmental testing laboratories conduct visual examination, preparation and analysis of samples within safety cabinets fitted with HEPA air extraction facilities. In addition, the ambient air of the asbestos laboratory is regularly measured to ensure a safe working environment for laboratory staff. In the absence of a screening system, or a laboratory design that is specially equipped for handling asbestos, the laboratory must be regarded as potentially contaminated by asbestos fibres if samples have been opened and handled. It is essential that all laboratory personnel are appropriately trained, are equipped with and wear the appropriate PPE and RPE and that appropriate decontamination procedures are followed.

The HSE also provide specific guidance on suitable clothing and footwear to be worn where there is a risk of potential asbestos exposure in <http://www.hse.gov.uk/pubns/guidance/em6.pdf>. Guidance is also provided on procedures for cleaning and disposal of this PPE.

Conventional laboratory cleaning and dust suppression procedures typically employed by geotechnical laboratories cannot be applied where there is an asbestos hazard present.

CAR 2012 require a written asbestos Risk Assessment and Plan of Work for cleaning, checking and maintaining the fume and recirculation cabinets and Class H vacuum cleaners. There must be documented records of the checks being carried out, with the date, signature and comments of the person carrying out the activity. Filters must be changed by a trained competent person following documented procedures, e.g. controlling the release of asbestos, and ensuring that the correct replacement filters are properly fitted. Cabinets should be regularly cleaned e.g. horizontal surfaces wiped with a wet disposable cloth or vacuumed

with a Class H vacuum cleaner. Any spills should be cleaned up at once. Procedures for disposal of contaminated materials and the capping of any vacuum hoses kept outside the cabinet should be documented and followed. CAR 2012 Regulation 13 requires that control equipment such as fume cupboards and recirculating fume cupboards used for asbestos are thoroughly examined and tested by a competent person at suitable intervals with the records kept for 5 years. For air extraction equipment the ACOP stipulates an examination frequency of 6 months.

3.5 Waste disposal

All disposable PPE, disposable RPE and clothing contaminated with asbestos is to be disposed of as asbestos waste.

Waste containing asbestos is a hazardous waste when asbestos or ACM is present at quantities greater than 0.1% by weight or when visual fragments of asbestos-containing material is present. Further guidance on assessment is provided in Environment Agency WM3.

3.6 Emergency Procedures

CAR 2012 require that written emergency procedures are developed for incidents involving asbestos. If during the sub-sampling, preparation or testing of the samples containing or potentially containing asbestos an uncontrolled release of fibres occurs which may have exceeded the exposure limits – work must stop and the appropriate emergency procedures put into action.

CAR 2012 requires that in the event of an accident, incident or emergency related to the uncontrolled release of asbestos an employer must, amongst other things, take immediate steps to:

1. warn people who may be affected;
2. exclude people from the area, who are not needed to deal with the release;
3. identify the cause of the uncontrolled release;
4. regain adequate control as soon as possible.

The information presented in the HSE asbestos essentials guidance EM1 is useful for emergency planning <http://www.hse.gov.uk/pubns/guidance/em1.pdf>.

4.0 Check List

The following prompt list for laboratory personnel is comprehensive but not exhaustive. Some of this information may be provided to the laboratory by the Project Manager or the person scheduling the laboratory testing but the laboratory should ensure it is available in a timely manner.

<input type="checkbox"/>	Receipt of the Desk study (see BS 10175) – is asbestos likely to be present?
<input type="checkbox"/>	Assessment of samples, as received, of potential to contain asbestos
<input type="checkbox"/>	Insurance for work with asbestos
<input type="checkbox"/>	Risk assessment to include likely fibre concentrations in air
<input type="checkbox"/>	Method statement to include control measures
<input type="checkbox"/>	Notification of risk to all parts of the laboratory
<input type="checkbox"/>	Emergency Procedures
<input type="checkbox"/>	Asbestos training – awareness, non-licensed work as minimum
<input type="checkbox"/>	Medicals and record keeping as appropriate
<input type="checkbox"/>	Inform all parts or other laboratories of likelihood of asbestos in samples
<input type="checkbox"/>	Add information into exploratory hole logs where samples testing positive for asbestos
<input type="checkbox"/>	Add information of asbestos in ground to CDM Health & Safety File

5.0 References and Further Reading

BSI (2001). Specification for recirculatory filtration fume cupboards

BSI (2003). BS EN 14175. Fume cupboards

BSI (2017). BS 10175:2011 +A2:2017 Investigation of potentially contaminated sites – Code of practice

Environment Agency et al. (2021). Guidance on the classification and assessment of waste – Technical Guidance WM3

Environment Agency (2017). The Quantification of Asbestos in Soils - Methods for the Examination of Waters and Associated Materials (Standing Committee of Analysts Blue Book Method) [***This has been withdrawn, awaiting clarification on republication of a revised draft***]

HSE (2021) HSG 248 Asbestos: The Analyst's Guide <https://www.hse.gov.uk/pubns/books/hsg248.htm>

HSE (2018). Guidance for appointed doctors on medical surveillance of workers doing licensed work with asbestos. MS31 (rev2) <https://www.hse.gov.uk/pubns/ms31.htm>

HSE (2018). Guidance for appointed doctors on medical surveillance of workers doing non-licensed work with asbestos MS34 (rev2) <https://www.hse.gov.uk/pubns/ms34.htm>

HSE (2013a). HSG53 Respiratory protective equipment at work: A practical guide <https://www.hse.gov.uk/pubns/books/hsg53.htm>

HSE (2013b). L143 Managing and working with asbestos Control of Asbestos Regulations 2012 Approved Code of Practice and guidance. <https://www.hse.gov.uk/pubns/books/l143.htm>

HSE (2015). L64 The Health and Safety (Safety Signs and Signals) Regulations 1996 - Guidance on Regulations <https://www.hse.gov.uk/pubns/books/l64.htm>

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