



## GUIDELINES FOR THE ASSESSMENT, REMEDIATION AND MANAGEMENT OF ASBESTOS-CONTAMINATED SITES - MAY 2009

### RECOMMENDED PROCEDURES FOR LABORATORY ANALYSIS OF ASBESTOS IN SOIL

June 2011

#### Purpose

This guidance material assists in the interpretation and application of procedures for the laboratory analysis of asbestos in soil as recommended in the [Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – May 2009 \(PDF 3386KB\)](#)

#### Background

The Western Australian Department of Health (DOH) and Department of Environment and Conservation (DEC) have published a package of documents on the assessment and management of asbestos in soil. The Guidelines, which were developed through consultation and gazetted under the *Contaminated Sites Act 2003* in August 2010, form the primary guidance.

The Guidelines build upon and aim for consistency with existing guidance and practice for the analysis of asbestos in soil (enHealth - 2005 and Australian Standard– AS4964-2004). However, if the Guidelines recommendations inadvertently conflict with AS4964-2004 or NATA asbestos analysis accreditation requirements, then DOH should be approached to discuss and help resolve these differences.

The Guidelines are expressed in terms of “should” and “recommend”. Alternative procedures may be acceptable if fully justified and demonstrated to achieve at least the same level of effectiveness.

The Guidelines recommend procedures for the field and laboratory assessment of the degree of asbestos contamination of soil. If circumstances are suitable, the Guidelines favour using asbestos containing material (ACM) in sound condition as the primary means of estimating contamination, by subjecting soil samples to on-site sieving and gravimetric procedures.

Where significant asbestos may be present as fibrous, friable, fine or free fibre material (see Glossary), then laboratory analysis may be necessary to help determine and delineate the impact.

#### Laboratory Analysis of Asbestos in Soil

The recommended laboratory procedures are **designed to improve the detection and reporting** of asbestos in soil and are outlined under section 4.1.8 *Analytical Procedures* on pages 32 and 33 of the Guidelines.



The practicable limit of detection for standard polarised-light microscopy (PLM) and dispersion staining analysis of asbestos in soil, as defined by AS4964-2004 is in the range 0.1% to 0.01% (0.1g/kg) weight for weight (w/w). Although the Guidelines' recommended measures are intended to improve the limit of detection, this depends very much on the nature of the contamination and the in-house laboratory procedures.

Where laboratories hold accreditation to conduct asbestos analysis by AS4964, any reporting of concentrations below 0.01% w/w will be outside the conditions set by the accreditation authority, NATA. Although NATA may not consider such results reliable, DOH would consider them a useful indication of level of contamination if provided.

In some circumstances DOH considers it will be possible to measure asbestos contamination at or lower than 0.001% w/w (the Guidelines' investigation criteria for asbestos fibre material). This is demonstrated in the example provided below under Sample Size. However, it is not practical to give a general quantitative estimate of the level of improvement as this will be variable and may not be feasible at all.

**0.1 - 0.01% w/w asbestos remain the standard limits of detection for asbestos in soil using the PLM method though use of the Guidelines may improve this in some cases**

The main analytical measures recommended in the Guidelines relate to sample size and a number of assessment-based statements expected to be included in laboratory reports.

## Sample size

The Guidelines recommend a minimum sample size of 500ml from each relevant soil stratum of each location for laboratory analysis. This may be 10 or more times the amount that is often submitted for analysis. The larger quantity can improve sensitivity of asbestos detection mainly during the standard laboratory pre-analysis screening of the sample through a 2mm sieve. As per AS4964-2004, the >2 mm fragments are then examined for presence of asbestos. Detection of any >2 mm asbestos fragments will be more likely with this volume of sample. A single 2x2x2 mm fragment would represent less than 0.001% w/w of the sample when factoring in say a 15% asbestos content of an asbestos cement fragment.

The sub-2 mm fraction can then be used to prepare a representative sub-sample for further analysis, including trace analysis, in accordance with AS4964-2004 and the laboratory's protocols. Any sub-sampling should use an appropriate validated procedure and be reported with the analytical results.

## Statement of Limit of Detection

"State the method's limit of detection"

This refers to the standard limit of detection (LOD) of the laboratory independently of what influence the application of the Guidelines recommendations may make. It is intended to check whether or not the laboratory technique used achieves the common 0.01% w/w asbestos detection limit associated with AS4964-2004.



## Asbestos Detected or Not

“Indicate if asbestos was detected or not detected, regardless of form”

It is important to state if asbestos of any form is detected. This is included because AS4964-2004 may allow for a nil detection if the asbestos is less than a certain concentration and is non-respirable. Although such qualifications may be appropriate for occupational health and safety purposes, which are the basis of AS4964-2004, this is not so in regard to public health. Factors that may raise the risk of public exposure include possible: involvement of sensitive groups; lifetime continuous exposure; and degradation of the material into respirable fibre over time.

If there is any uncertainty about unequivocal identification of fibres as asbestos or if laboratory cross-contamination is possible, this should also be stated.

A positive result would normally be considered by DOH to exceed the 0.001% w/w investigation criteria applied to fine asbestos material, especially given that a 0.01% LOD usually applies. However, a single such exceedance may not necessarily result in the sample source being deemed contaminated. A weight of evidence approach should be used by the consultant, auditor and regulator in assessing the significance of an exceedance, which should take account of the history of the site and frequency and occurrence of other positive and negative results.

## Description of the Asbestos

“If detected, indicate the type of asbestos and provide a factual description”

This is usually, but not always, a standard inclusion in the analytical report. It is useful because the form, size and type of asbestos may influence the risk and give indications about the source. It is an important input for the weight of evidence approach.

## Estimate of Concentration

“If practical, estimate the concentration of any asbestos”

This is recommended information if practical, especially for >2 mm size asbestos material. For any sub-2 mm asbestos material an alternative to a calculation based on weighing would be to use rough measurements of dimensions combined with knowledge of asbestos density.

## Consistency Statement

“State whether the analysis report is consistent with these Guidelines or not”

This is included to help ensure that even if not evident in the responses to the previous recommendations that the Guidelines recommendations have been adhered to. It also makes for an easy way of checking such adherence. An example of a consistency statement is:



"This report is consistent with the analytical procedures and reporting recommendations in the *Western Australia Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009.*"

## Implementation Issues

DOH expects that the Guidelines, including the recommended laboratory analytic procedures, will be applied by all relevant parties for the assessment of contaminated sites in Western Australia, unless justified and acceptable alternatives are provided.

Laboratories and referring consultants should ensure that the recommended laboratory analysis procedure is used. If Auditors or regulators identify analytical non-compliance late or at the end of the investigative, remediation and validation process this can be a major problem for stakeholders and can result in significant delays and additional costs.

These recommendations can be readily checked through the presence of a number of expected explicit statements. For ease of implementation stakeholders may wish to include related checklists in their procedures and standard text options in their reporting templates.

**Clear compliance with the Guidelines analytical recommendations will greatly assist regulatory acceptance of the related work**

If necessary, Toxicology Branch of DOH can be contacted on 08 9388 4999 or [ehinfo@health.wa.gov.au](mailto:ehinfo@health.wa.gov.au) regarding general interpretation and application of the Guidelines.

## References

*Australian Standard Method for the Qualitative identification of asbestos in bulk samples – AS4964-2004.*

*Management of asbestos in the non-occupational environment – enHealth 2005*

DOH publications on asbestos in soil are available at:

[http://www.public.health.wa.gov.au/3/1144/2/contaminated\\_sites.pm](http://www.public.health.wa.gov.au/3/1144/2/contaminated_sites.pm)

## Glossary\*

<b>Asbestos-Containing Material (ACM)</b>	Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7 x 7 mm sieve.
<b>Asbestos Fines (AF)</b>	Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7 x 7 mm sieve.
<b>Fibrous Asbestos (FA)</b>	Friable asbestos material, such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

\* From pages 52 and 53 of the Guidelines

