



Assessment of Asbestos Concentrations in Soil for HSL Comparisons under the 2013 ASC NEPM

The 2013 Assessment of Site Contamination NEPM introduced a fundamental shift in the requirements for asbestos assessment in soils. This EnviroMail™ covers forms of asbestos, definitions and field considerations with EnviroMail™ 78 covering Asbestos Fines and Fibrous Asbestos analysis, interpretation and limitations.

Previously all forms of Asbestos were classified together and assessed in terms of 'presence or absence,' according to the qualitative analysis in Australian Standard A4964-2004. The 2013 NEPM however, adopted the WA Department of Health approach, under which various forms of asbestos in soil can be quantitatively determined or estimated and assessed against Health Screening Levels (HSLs) for different land uses.

Under the 2013 NEPM, a low level of asbestos in soil does not necessarily render a site contaminated:

"Where there is a high degree of confidence that the asbestos contamination is confined to bonded ACM in superficial soil, assessment can proceed directly to remediation (removal of bonded ACM fragments and ensuring that the soil surface is free of visible asbestos) and validation."

The NEPM categorises different forms of asbestos as;

- » Bonded ACM: Bonded Asbestos-Containing-Material in sound condition e.g. vinyl tiles, cement fencing or resin that cannot pass a 7mm sieve.
 - » Note: If site conditions are likely to degrade the ACM e.g. acidic soils, then bonded ACM should be treated as FA for comparison to guidelines.
- » Fibrous asbestos (FA) ACM in a degraded condition 'that can be broken or crumbled by hand pressure'. This may be un-bonded or severely degraded ACM.
- » Asbestos Fines (AF) includes free and small fibre bundles + ACM fragments that pass a 7mm sieve.
- » Free fibres: Although not explicitly defined in the NEPM, free fibres are taken to mean fibres found during trace analysis per AS4964. Whilst included in the NEPM definition of AF, the NEPM asserts that there is no validated method available to reliably estimate the concentration of free fibres in soil.

What does this mean for Consultants?

Site assessment requires the consideration of:

- » Different forms of asbestos and reporting limits
 - » Bonded ACM, Fibrous Asbestos and Asbestos Fines
 - » Free fibres
- » Different sample sizes and costs of analysis
- » New field techniques

NEPM -B1 indicates 'Most assessments will involve non-friable bonded forms of ACM, as this is the most common type of asbestos soil contamination in Australia.'



ASBESTOS IN SOIL AND HEALTH RISK – NEPM B1

The highest risk for human health is from inhalation of fibres. The condition of the asbestos materials and the potential release of fibres is therefore crucial. Bonded ACM in sound condition generally represents a low human health risk. Asbestos fines (AF) and fibrous asbestos (FA) materials however, have the potential to generate respirable asbestos fibres. FA and AF must be carefully managed to prevent the release of asbestos fibres into air. Table 7 from NEPM B1 (below) summarises the health screening levels for Asbestos.

Table 7. Health screening levels for asbestos contamination in soil

Form of asbestos	Health Screening Level (w/w)			
	Residential A ¹	Residential B ²	Recreational C ³	Commercial/Industrial D ⁴
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF ⁵ (friable asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

TESTING OF BONDED ACM

Targeted sampling of potential bonded ACM may be confirmed by laboratory testing for asbestos or the material should be assumed to contain asbestos. This testing for presence or absence is performed under ALS method code EA200B.

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If the presence of asbestos is confirmed in larger pieces of ACM (>7mm), further testing may involve assessment of other factors (e.g. friability, acid or physical degradation risk) to confirm whether the material is classified as 'bonded' or 'friable' for comparison to guidelines (see below). This assessment may be conducted by a consultant or the laboratory.

Friability Testing

If requested, the laboratory can conduct a friability test on ACM as outlined by Safe Work Australia under ALS method code EA156. This qualitative test involves applying hand pressure to a dry sample of ACM to assess if it crumbles to a powder. This test is not performed and the descriptors 'friable' and bonded are not used in sample descriptions unless specifically requested. If requested with Asbestos quantitation, the crumbled ACM is included in the weight of Friable Asbestos.

If the sample is confirmed to contain asbestos, then the soil concentration can be calculated from the original sample size and compared to the appropriate 'Bonded ACM' or 'FA and AF' health screening levels (refer to table 7 overleaf).

Assessment of Potential ACM (>7mm)

Option 1: Field staff sample (e.g. hand pick or sieve at 7mm) potential ACM and either weigh the recovered potential ACM or submit samples for laboratory assessment. The total sample weight may be estimated in the field from the sample volume (e.g. a 10 litre bucket). The laboratory can confirm asbestos presence (qualitative) and report an accurate measured weight of 'ACM >7mm' (as received). ALS may report the percentage 'Asbestos Containing Material (as 15% Asbestos in ACM >7mm)' in soil by applying the default assumptions in NEPM B1 section 4.10 and using the estimated sample weight supplied by the client.

Option 2: Field staff can also submit a 10Litre sample for sieving and analysis however this incurs additional costs (including freight) as the laboratory must sieve the entire sample to 7mm and different soil matrices take different preparation times so costs vary significantly. The plus 7mm fraction can then have any potential ACM separated and analysed as for bulk materials. In this scenario the laboratory can weigh the bulk sample. This will allow a more accurate determination of the actual ACM asbestos concentration for comparison directly to table 7 HSLs. The minus 7mm fraction can also be subsampled (500mL recommended) and one or more subsamples laboratory tested to assess AF and FA.

Important notes

Note 1: As other bonded products may contain higher amounts of asbestos e.g. floor tiles, if this risk is identified in the PSI then calculations will need to be varied accordingly. ALS will only report the 'weight of asbestos' assuming 15% asbestos concentration in the ACM unless specifically requested otherwise.

Note 2: ALS will assume multiple ACM fragments in a sample container are from the same source and will only test one discrete piece for presence/absence. Material of different appearance or origin should be submitted as different samples.

Note 3: Some soils may not be able to have potential ACM separated easily – e.g. firm clays. NEPM guidance (B1 section 4.11) suggests that for such cohesive soils it may be best to skim the top 5-10cm for disposal with localised handpicking to remove visual asbestos). Asbestos testing in clays by washing is possible however higher preparation charges apply.

Where asbestos is present but suspected to not be 'bonded ACM', quantitation of FA and AF may be required with a NEPM HSL limit of 0.001%. Analysis of FA and AF asbestos is a more complex issue and is covered in EnviroMail™ 78.

References

NEPM B1 Guideline on Investigation levels for Soil and Groundwater – May 2013 (F2013L00768)

Asbestos 'Due Diligence' assessment in 'Grab Sample' soils

As defined in the NEPM, Asbestos Fines (apart from bonded ACM that may become degraded) must pass a 7mm sieve. In some scenarios a practitioner assessing asbestos risk on a site may perform 'due diligence' sampling, even when no potential ACM is visible. This may involve taking samples for asbestos presence/absence determination. Small samples (e.g. 40-50g) across multiple locations may be a suitable way of assessing the presence of asbestos fines in this case. This is covered under ALS reporting for presence/absence in grab samples. If asbestos is detected further sampling and quantification may be required.

NATA ACCREDITATION AND ANALYSIS OF ASBESTOS

ALS NATA accreditation covers qualitative identification of Asbestos by AS4964. NATA allows asbestos quantitation results to be reported on endorsed reports (but not where they appear as the only result) if they are clearly identified as such, with appropriate disclaimers and in accordance with NATA Policy Circular 18 Rules. Sample and ACM weights generated by the laboratory are traceable to International Standards with asbestos Identification carried out by NATA Approved Identifiers.

SAMPLE SUBMISSION:

- » Potential ACM (under option 1): Sealed bags containing fragments (typically 1g to 50g) of potential ACM should be provided in a sealed container or larger bag or in well-sealed soil jars (wiped clean) for safety reasons.
- » Bulk soil samples (under option 2): 10 Litre sample in a sealed bucket
- » Bulk soils sieved to minus 7mm: 500mL sealed in strong plastic bags in an outer sealed container or larger bag
- » Due Diligence 'grab' soils: 40-50g sealed in strong plastic bags in an outer sealed container or larger bag.

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