

Asbestos Analysis at Hill Labs

Introduction

Asbestos is a naturally occurring silicate mineral. Each visible fibre is composed of millions of microscopic "fibrils" that can be released by abrasion and other processes. It is now known that inhalation of asbestos fibres can cause serious and fatal illnesses including malignant lung cancer, mesothelioma, and asbestosis.

Large scale asbestos mining began in the late 19th century when manufacturers and builders used asbestos because of its desirable physical properties such as sound absorption, tensile strength, its resistance to heat & fire, and affordability. It was used in applications such as electrical insulation, claddings and coatings. Its use continued to grow, until the carcinogenic effects of asbestos dust resulted in its phasing out and eventual banning. In New Zealand bans on importation of certain forms of asbestos started in the 1980s, but full removal from manufactured products did not occur until many years later.

There are six regulated types of asbestos fibre; Amosite, Chrysotile, Crocidolite, Fibrous Actinolite, Fibrous Anthophyllite and Fibrous Tremolite. The laboratory is able to report on the three major types although our analysts are able to detect the three minor types. See Table 1.

Table 1.

Major Asbestos Type	Common Name
Amosite	Brown Asbestos
Chrysotile	White Asbestos
Crocidolite	Blue Asbestos

Sampling Guidelines for Analysis at Hill Labs

It is recommended that asbestos sampling be undertaken by suitably experienced professionals, although homeowners can take and submit their own samples if they take reasonable steps to protect themselves and prevent asbestos fibre release. The following link to the Worksafe website provides a useful guide for the homeowner.

<https://www.worksafe.govt.nz/topic-and-industry/asbestos/information-for-homeowners/>

Analysis of Solid Materials (also known as 'Bulk' or ACM)

Note: All bulk samples need to be individually double bagged in ziplock bags to ensure the safety of all handling them.

For hard materials, such as soffit, cladding, fibre cement, decramastic roof tile, etc. we need a minimum sample size of a NZ\$2 coin, or no bigger than a credit card sized piece.

Scrapings of textured ('popcorn') ceilings or plaster should be taken from 4-5 areas and combined into one sample per ceiling/room. This ensures a sample representative of your surface is obtained, as the asbestos fibres can be inconsistently spread in these types of materials. You can wet the surface first with some water containing a small amount of dishwashing liquid, and allow to soak in, to reduce dust being created. A sample the size of a tablespoon is preferred.

Vinyl flooring should be sampled to include all layers, including insulative backings and adhesives, as often this is where the asbestos is found. We require at least a 5x5 cm square.

If you have dust and/or debris to collect, this is often best done with a swab or wipe, moistened with water. Water based wipes from the supermarket are acceptable as long as they contain no other additives. Please do not use alcohol based wipes. At least a teaspoon's worth of material is preferred.

We do recommend consulting a qualified asbestos surveyor if you are not confident sampling yourself, or need further information.

An example report of results for bulk analysis can be found in Appendix A of this document.

Analysis of Soils

Soil samples are normally taken as part of a detailed site investigation by a contaminated land professional, or qualified asbestos surveyor.

As per standard methodology, the laboratory needs to process the entire sample submitted, so submitting samples of the correct size is very important. Containers supplied must be filled entirely. The laboratory has two specific sample containers for asbestos:

Presence / Absence - 125 ml (PSoil125asb).

New Zealand Guidelines Semi-Quantitative (also known as BRANZ) - 500ml (PSoil500asb).

The laboratory reserves the right to apply additional fees for samples that greatly exceed 500ml, as this places significant additional workload on the analysts.

Please provide additional containers for each soil sample if other testing is required, as the asbestos container is reserved for asbestos analysis only.

Analysis Methods

Bulk samples

The identification of asbestos is performed using optical microscopy. Samples are often ashed prior to analysis to remove organic material and provide a sample suitable for fibre identification. Any fibres present are initially observed using low powered (10-40x) stereo microscopes. Fibres are isolated from the matrix and tentatively identified by the analyst based on their appearance and characteristics.

The isolated fibres are mounted onto slides using refractive index liquids. The slides are then examined at a higher magnification using a polarised light microscope. Various confirmatory observations are made to ensure a reliable result.

Final results are reported in a detected/not detected format.

Soil Samples

Semi-Quantitation of Asbestos

The sample is oven dried before being sieved into three fractions; >10mm, 2-10mm, and <2mm. The <2mm fraction is then sub sampled into a ~60g portion, which is then ashed. At each stage, the weight is taken of each fraction so the pre-ashed weights are available. The >10mm, 2-10mm fractions and the <2mm sub-sample are examined for asbestos. Any asbestos found will be identified and reported.

The weight of asbestos in each fraction will be calculated, and will be reported as a concentration of asbestos in the sample as a whole (based on dry weight) as well as a factual description of the type of material found. For New Zealand Guideline reporting, the asbestos concentration will be split between Friable and Non-Friable asbestos. Final results are reported as a weight/weight %. An example report can be found in Appendix A.

Asbestos Presence/Absence

The testing is performed in a similar manner to the semi-quantification method with the sample being weighed, ashed and separated into 3 (>10mm, 2-10mm, <2mm) fractions prior to examination. The presence of asbestos and its form are reported. The weight of asbestos or from which fraction it was recovered from, is not reported. As with the semi-quantification method the <2mm fraction maybe sub-sampled and this will be noted on the report and the weight of the sub-sample reported.

Final results are reported in a detected/not detected format. An example report can be found in Appendix A.

The laboratory is IANZ accredited for bulks and soils, following the Australian Standard AS 4964-2004, "Method for the qualitative identification of asbestos in bulk samples".

Appendix A

Example Reports

Bulk Analysis

Sample Type: Building Material				
Sample Name	Lab Number	Sample Category	Sample size (weight or dimensions)	Asbestos Presence / Absence
Sample A		String / Rope	1	Chrysotile (White Asbestos) detected.
Sample B		Other #1	5.44	Asbestos NOT detected.
Sample C		Lagging / Insulation	2.4	Chrysotile (White Asbestos) detected. #2
Sample D		Bituminous Product	1.79	Asbestos NOT detected.
Analyst's Comments				
#1 Plaster				
#2 Fibres found on surface of non-asbestos insulation.				

Soil: Presence/Absence

Sample Type: Soil						
Sample Name	Lab Number	As Received Weight	Dry Weight	<2mm Subsample Weight	Asbestos Presence / Absence	Description of Asbestos Form
Soil Sample A		597.9	500.4	63.8	Chrysotile (White Asbestos) detected.	Loose Fibres
Soil Sample B		425.9	358.8	58.9	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	Loose Fibres

Soil: Semi- Quantitative

Sample Type: Soil					
Sample Name:	SS001	SS002	SS003	SS004	SS005
Lab Number:					
Asbestos Presence / Absence	Amosite (Brown Asbestos), Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.	Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.	Amosite (Brown Asbestos), Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) and Crocidolite (Blue Asbestos) detected.
Description of Asbestos Form	ACM debris, Loose fibres	Loose fibres	ACM debris, Loose fibres	-	Loose fibres.
Asbestos in ACM as % of Total Sample*	% w/w < 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w < 0.001	< 0.001	0.003	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w < 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w < 0.001	< 0.001	0.003	< 0.001	< 0.001
As Received Weight	g 988.1	800.1	876.6	980.0	902.2
Dry Weight	g 814.7	741.8	807.7	887.9	804.4
Moisture	% 18	7	8	9	11
Sample Fraction >10mm*	g dry wt 155.1	121.6	291.0	167.5	133.9
Sample Fraction <10mm to >2mm*	g dry wt 468.3	460.5	349.0	419.6	438.9
Sample Fraction <2mm*	g dry wt 190.7	159.0	167.6	300.0	231.1
<2mm Subsample Weight*	g dry wt 53.0	52.6	51.8	52.4	52.4
Weight of Asbestos in ACM (Non-Friable)	g dry wt < 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)*	g dry wt < 0.00001	< 0.00001	0.00177	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt 0.00130	0.00147	0.02566	< 0.00001	0.00616