



# Safe Work Procedure

## Bulk Asbestos Sampling

### Abstract

This guide has been produced to assist workers, building owners and members of the general public to safely conduct bulk sampling for asbestos. This document complies with the *Saskatchewan Employment Act*, *Saskatchewan Occupational Health and Safety Regulations*, the *Saskatchewan Asbestos Abatement Manual*, the National Institute for Occupational Safety and Health (NIOSH) 9002 Sampling Methods and best practices within the industry.

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## 1.0 Purpose

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This Safe Work Procedure has been developed to outline the recommended steps to safely collect bulk asbestos samples for laboratory analysis. It should be used to ensure that competent personnel perform work, that appropriate techniques and equipment are being used, and that appropriate documentation is prepared and submitted along with the samples. Implementation of this procedure is the responsibility of all people who perform this work. This safe work procedure has been established to ensure that consistent, reliable results are obtained.

## 2.0 Background

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Asbestos is a class of magnesium-silicate minerals that occur in fibrous form. Minerals in this group include chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos and actinolite asbestos. Asbestos was and is used in the manufacture of some heat-resistant clothing, in automotive brake and clutch linings, and in a variety of building materials including insulation, floor tiles, roofing felts, ceiling tiles, asbestos-cement pipe and sheet, and fire-resistant drywall. Asbestos may also be present in pipe and boiler insulation materials and in sprayed-on insulation materials located on beams, in crawlspaces and between walls.

## 3.0 Scope

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Asbestos is managed within buildings built prior to the year 2000 to prevent, or minimize, exposure to asbestos-containing materials (ACM). If ACM is in poor condition, is disturbed or damaged, it could release fibres into the air, which if breathed in, can cause serious lung diseases. The purpose of bulk sampling is to collect representative samples of materials that are suspected to be asbestos-containing. The purpose of laboratory analysis is to determine whether asbestos is present and, if present, the type and percentage content.

Please refer to the Saskatchewan Asbestos Abatement Manual (2017) for a summary of the types of asbestos used in building materials throughout history as well as a list of potential asbestos-containing building materials. Generally, asbestos may be found in the following areas:

- building exterior and roof
- flooring
- ceilings
- walls
- service areas (boiler rooms, mechanical rooms)
- structural
- piping systems

ACM that break down easily are considered friable (for example, spray-applied insulation) and pose a greater hazard. ACM that are more tightly bound together and less likely to break down easily are considered non-friable (for example, vinyl floor tile).

In Saskatchewan, collecting bulk samples of building materials suspected to contain asbestos for the purpose of identification is considered a low-risk asbestos process and, as such, the provincial regulations should be followed.

This document does not address survey techniques for ACM. These are outlined in Saskatchewan Workers' Compensation Board (SK WCB) Safe Work Procedure - Conducting Asbestos Surveys.

## 4.0 Roles and responsibilities

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All workers, regardless of their job title, have a responsibility for their own health and safety and the safety of others at their worksite.

- Employers
  - Ensure, as far as reasonably practicable, the health and safety of workers.
  - Ensure compliance with legislative requirements.
  - Ensure that processes are documented and communicated to workers prior to the start of work.
  - Ensure that work is sufficiently and competently supervised.
  - Ensure that workers are provided with appropriate training, administrative procedures, equipment and PPE to complete their tasks safely.
  - Ensure that a risk assessment is completed for each task prior to the start of work and that controls are implemented to reduce hazards.
  - Ensure that a hazard reporting system is implemented.
  - Ensure that incidents are investigated.
- Supervisor
  - Arrange for a competent worker who possesses the knowledge, experience and training to perform the bulk asbestos sampling.
  - Coordinate and direct the work in a manner that minimizes and controls risk to the workers.
  - Instruct workers in safe work practices and procedures.
  - Enforce health and safety regulations.
  - Coach and correct unsafe work acts.
  - Report and investigate all incidents.
  - Promote safety awareness among workers.
  - Provide and ensure that workers use the appropriate personal protective equipment (PPE).
  - Ensure that workers use the appropriate respiratory protective equipment (RPE), that they have been fit-tested and that the results are recorded.
- Workers
  - Understand the hazards associated with bulk asbestos sampling.
  - Work in a safe manner to ensure their own safety, the safety of their co-workers and the safety of the general public (where applicable).
  - Report all hazards, near losses and incidents to the Supervisor.
  - Follow established safe work procedures as directed by the Supervisor.
  - Workers are also responsible for using assigned PPE and RPE in an effective and safe manner, using prescribed engineering controls as well as administrative work practices.
- General Public
  - Respect and follow directions during bulk asbestos sampling activities.
  - Respect warning signage and banner tape.
- Building Owner
  - Provide access requirements and disclose known hazards prior to the start of bulk asbestos sampling.

## 5.0 Assessment of hazards

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Sampling for ACM can lead to exposure to asbestos if appropriate controls are not applied. A risk assessment should be completed prior to planned asbestos bulk sampling and this should set out the control measures and PPE that should be used. The sampling personnel should have adequate information, instruction, training and experience to safely proceed with the work.

Common hazards to consider when collecting bulk asbestos samples include:

- **chemical hazards:** exposure to ACM
- **ergonomic hazards:** hand/muscle strain from using hand tools, awkward positioning during sample collection, back strain from carrying equipment
- **health hazards:** working in a public space during a pandemic, exposure to biological hazards
- **physical hazards:** working outdoors in cold/hot temperatures, exposure to noise, low levels of light, unknown site conditions
- **safety hazards:** cuts/injuries from sharp debris, injuries from flying debris while using power tools, entanglement while using power tools, injury from falls while working at heights, slips, trips and falls, working around forklifts, working around heavy equipment, working near machinery with moving parts, working near live equipment, driving
- **workplace hazards:** working alone, confined spaces, weather conditions

## 6.0 Recommended hazard controls

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When considering methods to control or mitigate a hazard, elimination of the hazard shall be considered first. If elimination is not practical, controls are evaluated according to the hierarchy of controls. Often, hazards will be mitigated by a combination of the types of controls available.

### 6.1 Substitution

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Substitution is the act of replacing the hazard with something less hazardous, including:

- using a scissor lift to access ceiling spaces instead of a ladder
- using knives with retractable blades rather than non-retractable blades

### 6.2 Engineering controls

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Engineering controls isolate workers from the hazard/control hazard at its source, including:

- using a cart to transport equipment
- installing emergency or portable lighting
- locking out energized equipment
- identification and locking out of confined spaces

### 6.3 Administrative controls

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Administrative controls refer to development and communication of processes to control the hazard, including:

- conducting a site inspection prior to start of work
- rescheduling work to manage exposure to extreme temperatures and/or adverse weather, or to manage site conditions (heavy equipment traffic, forklift traffic)
- scheduling rest breaks

- arranging bulk asbestos sampling to be conducted in teams of two or more workers when working alone is a concern or to allow for spotters in areas where site conditions include operation of heavy equipment or forklifts
- arranging for specific training, confined space entry and rescue procedures if entering a confined space is a necessity
- providing training on hazards and controls
- using safe work procedures

## 6.4 Personal protective equipment (PPE) and respiratory protective equipment (RPE) required

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PPE and RPE are considered the last line of defense and protects the worker from the hazard. The following are generally recommended for conducting asbestos surveys, but PPE and RPE selection is dependent on the specific task and work environment. In areas where noise levels exceed 85 dBA, noise reducing ear plugs or muffs would be required.

A risk assessment should be completed prior to the start of any task to determine the specific PPE required. PPE to be used during bulk asbestos sample collection may include the following:

- safety glasses
- steel-toed boots
- hard hat
- cut-resistant gloves (worn under nitrile gloves)
- disposable coveralls
- nitrile gloves (multiple gloves required)
- half-face dual cartridge respirator equipped with p100 filters
  - the respirator must be fit-tested

All PPE and RPE should be inspected regularly and maintained following manufacturer's recommendations.

## 7.0 Work instruction

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### 7.1 Equipment required

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The following equipment and/or materials are recommended for conducting asbestos surveys:

- |                              |  |  |
|------------------------------|--|--|
| • pliers                     | • duct tape                                    | • asbestos waste bags  |
| • screwdrivers               | • caulking                                     | • flat metal scoop (for collecting vermiculite insulation samples) |
| • retractable blade knife    | • laser distance measurer                      | • camera/phone   |
| • chisel                     | • laboratory chain of custody form             | • building floor plans   |
| • needle nose pliers         | • disposable wet wipes, water and spray bottle | • project logbook/field notes binder                               |
| • hook knife                 | • asbestos warning signage and banner tape     | • permanent marker   |
| • hammer                     | • polyethylene sheeting                        | • sealable sample bags (small, medium, large and extra large)      |
| • paint scraper              |  | • glass sampling jars  |
| • sledgehammer or core drill |  |  |

Equipment should be inspected regularly and maintained following manufacturer's recommendations. Do not use broken or damaged equipment.

## 7.2 General sample procedure

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Following the completion of a risk assessment and application of controls, the following steps should be taken to collect bulk asbestos samples:

1. Sample(s) shall be collected when the area is not occupied. Only the person(s) required for sampling shall be present in the immediate area. Isolate the sampling area by installing the appropriate warning signage and/or banner tape.
2. A ladder may be necessary to access building materials at heights. Ensure the ladder is properly inspected prior to each use. Do not work above the top two rungs and do not overextend while working on the ladder. Maintain three points of contact and use a toolbelt as necessary to carry tools.
3. If a ladder is insufficient, a scissor lift may be necessary to access suspect building materials at heights. Workers must have appropriate training and experience prior to using the scissor lift and work in groups of two or more. Fall protection equipment and lift training is required. An appropriate lift must be selected based on site conditions and outdoor work may need to be rescheduled depending on weather or wind conditions. Scissor lifts must be inspected prior to use.
4. A fit-tested, half-face dual cartridge respirator equipped with P100 filters must be worn. Sampling from overhead will be avoided if possible; if this is unavoidable, the use of disposable coveralls may be required.
5. Ensure an adequate supply of wet wipes, water, polyethylene sheeting, waste bags and other equipment for decontamination purposes is present prior to initiating sample collection.
6. Additional personal protective equipment (PPE) such as cut-resistant gloves, nitrile gloves, safety glasses, steel-toed boots, hard hats, etc., will be worn when applicable and as required to maintain compliance with site policies.
7. Collect separate samples of materials with different appearances, colours and textures.
8. A new pair of disposable gloves will be donned prior to collecting each sample.
9. Place a drop sheet of polyethylene below the area to be assessed to capture any dust or debris.
10. Spray the sample surface with a light mist of water to minimize fibre release during sampling. Do not disturb the material any more than necessary.
11. A sample will be taken by penetrating the entire depth of the material to the substrate. Sample size will be approximately 8 to 12 grams (one tablespoon). The tool used for collecting the sample must be wiped clean with a disposable wet wipe prior to and upon completion of collection of each sample to avoid potential cross-contamination.
12. When cutting into a material, ensure that no skin is exposed between the gloves and the cuff of coveralls; wear wristlets if deemed required. Wear cut-resistant level 3 gloves.
13. Inspect materials for slivers, jagged or sharp edges before handling objects and keep body parts out of the line of fire. Always consider, where will my hand go if it slips during cutting activities.
14. Seal the sample in a sample/zip lock bag or a glass jar with secure lid and label with a location and sample number. The sample bags (if using them) are then to be placed into a larger sample/zip lock bag that has been securely sealed.
15. All surfaces adjacent to the sample location are to be wiped down upon completion of sampling activities and the poly drop sheet is carefully removed in a manner that avoids spreading dust or debris and disposed of asbestos-containing waste. The sample location is to be repaired utilizing duct tape or caulking as applicable to the location and building material sampled.

16. All tools and equipment within the work area are to be wiped down and cleaned upon completion of sample collection. Check for visible dust and debris and clean prior to leaving the area.
17. Disposable gloves should be removed and replaced prior to collecting a new sample to avoid cross-contamination.
18. All wipes, debris and other disposable equipment/supplies are to be placed in asbestos labelled waste bags upon completion of the sampling activities. All waste is to be disposed of as asbestos-containing waste at a landfill capable of accepting asbestos-containing waste.
19. Collect a photograph of the sample location and mark the sample location on a floor plan (if applicable).
20. Record the sample number and sample details in a spreadsheet, considering the following:
  - a. sample location
  - b. type of material
  - c. colour of material
  - d. other defining characteristics (e.g. 12" x 12" floor tile)
21. When numbering homogeneous samples, create a sample group by including a number and a letter, for example: If sample group 1 includes three samples they would be named 1a, 1b and 1c.
22. The large bag of samples should be labelled as laboratory samples. Include a WHMIS label (sample quantity less than 10 kg) that includes: a product identifier, a statement to the effect that the material may contain asbestos, the statement "Hazardous laboratory sample. For hazard information or in an emergency call...", and an emergency phone number.
23. Complete the asbestos chain of custody form and submit the samples to an accredited laboratory.

## 7.3 Homogeneous sample groups

The *Saskatchewan Asbestos Abatement Manual (2017)* provides a guideline regarding sampling homogeneous material. This has been provided in Table 1: Number of bulk samples to be collected for homogeneous materials.

Table 1: Number of bulk samples to be collected for homogeneous materials

Type of material	Size of area of homogeneous material	Minimum number of bulk samples to be collected
Any homogeneous material, including, but not limited to, fireproofing, drywall joint compound, ceiling tile stucco, acoustical and stipple finishes and visually similar floor tiles.	Less than 1000 ft <sup>2</sup> (< 90 m <sup>2</sup> )	3
	1000 – 5000 ft <sup>2</sup> (90 – 450 m <sup>2</sup> )	5
	More than 5000 ft <sup>2</sup> (> 450 m <sup>2</sup> )	7

Source: *Saskatchewan Asbestos Abatement Manual (2017)*

For homogeneous materials, samples should be collected at random locations to ensure that the material collected is representative.

## 7.4 Collecting samples of vermiculite insulation

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In Saskatchewan, vermiculite is deemed an ACM unless laboratory results indicate that the material is asbestos-free.

In addition to steps 1) through 9) outlined in Section 7.2, the following steps should be completed when collecting bulk samples of vermiculite in an attic space:

1. A minimum of three samples are required as the asbestos content in vermiculite is highly variable.
2. A bulk vermiculite sample should be a minimum of four litres in volume.
3. Collect samples using a flat edged metal scoop. Ensure vermiculite is gathered from throughout the depth of the material by:
  - a. inserting the scoop into the insulation until it reaches the substrate
  - b. moving the scoop along the bottom
  - c. raising it through the remaining material
4. Follow the steps 14) through 23) outlined in Section 7.2 for decontamination of sampling equipment and submission of samples.

Vermiculite insulation may also be present within concrete block/cinderblock walls or precast wall panels. Prior to assessing for vermiculite insulation in cinderblock or precast wall panels, the surveyor should confirm with the site contact or through site drawings that the walls actually have a cavity, prior to drilling. Assess drawings for information related to vermiculite insulation in block walls.

Assess the walls for potential access holes/hatches where you can visually examine for the presence of vermiculite insulation. If no access is present, plan to create access holes in the wall using a sledgehammer or core drill.

In addition to steps 1) through 9) outlined in Section 7.2, the following steps should be completed when assessing concrete cinderblock or precast walls for vermiculite insulation:

1. Confirm that the sampling area is restricted only to workers using appropriate PPE and RPE.
2. Don safety glasses with side shields.
3. Use duct tape to secure the drop sheet to the bottom of the wall below the work area to capture debris.
4. Using a sledgehammer or core drill, create a series of small openings towards the bottom of the wall. When looking at the block, the goal is to drill into the hollow interior cavities on either side of the centre plane. Plan to create holes approximately four centimetres on either side of the centre plane and approximately eight centimetres above any mortar or the base of the block.
5. Surveyors should plan to assess multiple locations along the lower portion of the wall as distribution of vermiculite insulation can be uneven.
6. Follow the steps 14) through 23) outlined in Section 7.2 for decontamination of sampling equipment and submission of samples.

## 7.5 Asbestos wipe sampling

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Currently there are no criteria for asbestos levels on surfaces. Asbestos wipe sampling can be completed to assist in the evaluation of asbestos contamination on surfaces. An asbestos wipe sampling strategy and interpretation of results should be completed in consultation with an adequately qualified and experienced environmental consultant. Asbestos wipe samples should not be used as a direct comparison to, or be used to determine if, a material is asbestos-containing. Wipe samples should also not be used if there is an elevated airborne asbestos fibre concentration in a building or on a worksite.

More information regarding asbestos wipe sampling is provided in the Saskatchewan Asbestos Abatement Manual (2017).

## 8.0 Laboratory analysis

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Bulk samples should be sent under chain of custody to laboratories accredited in asbestos analysis of bulk samples.

The following are the most common methods used for laboratory analysis of bulk asbestos samples:

- National Institute for Occupational Safety and Health (NIOSH) Method 9000, Asbestos Chrysotile by XRD
- NIOSH Method 9002 Asbestos (bulk) by Polarized Light Microscopy (PLM)
- Environmental Protection Agency (EPA) Test Method for the Determination of Asbestos in Bulk Building Materials (EPA/600/R-93/116, July 1993) using PLM, Transmission Electron Microscopy (TEM) or Scanning Electron Microscopy (SEM)
- EPA Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation (EPA/600/R-04/004, January 2004)

Asbestos analysis conducted using PLM has a detection limit of approximately 1% asbestos by mass. Point counting is used to increase the accuracy and precision of the analysis. Detection limits using point counting are as follows:

- 200 Point Count - < 0.5%
- 400 Point Count - < 0.25%
- 1,000 Point Count - < 0.1%

Asbestos analysis by TEM and SEM is used to provide a method for detection of thin fibres below the resolution of optical microscopy providing more accuracy and precision.

Accreditation ensures that labs have the necessary equipment and personnel to complete the analysis, as well as the ability to conduct the analysis in accordance with established standards and methods. The key laboratory accreditations for asbestos analysis in Canada and the United States include:

- Institut de Recherche Robert-Sauvé en Santé et en Sécurité du Travail (IRSST)
- National Voluntary Laboratory Accreditation Program (NVLAP) for PLM and TEM Asbestos Analysis
- American Industrial Hygiene Association Proficiency Analytical Testing Programs (AIHAPAT), Bulk Asbestos (BAPAT)

## 8.1 Chain of custody

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The chain of custody form keeps samples organized and is a legal agreement between the laboratory and the company submitting the samples. Samples are relinquished to the laboratory and legal permission is given to allow the laboratory to analyze the samples.

The chain of custody should include the following information:

- your contact name and address
- location name and/or address where the samples were collected from
- project number or identifier (if applicable)
- sample information including sample number, type of material, location and colour
- sample date and time
- type of analysis required
- turnaround time

For homogeneous sample groups, you may consider asking the lab to conduct a stop positive when analyzing the samples. In this case, if a sample in a homogeneous group is analyzed and found to contain asbestos, the lab will not analyze the remaining samples in that group. The one positive sample would indicate that the homogeneous material should be considered an asbestos-containing material. This is often used when cost of sample analysis is a concern.

## 9.0 Sample reporting

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Once the laboratory analysis is complete, you will receive a report of the analysis results. Typically, results include comments on the percentage of non-asbestos fibres and the percentage of asbestos fibres present within the sample analyzed. In Saskatchewan, asbestos is defined as:

- vermiculite determined to contain any asbestos
- any other material that when tested contains more than 0.5% of friable asbestos, or more than 1.0% non-friable asbestos
- any material likely to contain asbestos

When assessing homogeneous materials, if one or more samples from the sample group is identified as asbestos-containing, the entire sample group must be considered an asbestos-containing material.

## 10.0 Questions

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If you have any queries regarding this SWP please contact the WCB employer resource centre at [ERC@wcbask.com](mailto:ERC@wcbask.com) or 1.833.961.0042.

## 11.0 References

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*Guidelines for Managing Asbestos in Buildings*, WorkSafe Saskatchewan

*Saskatchewan Occupational Health and Safety Regulations, 2020*

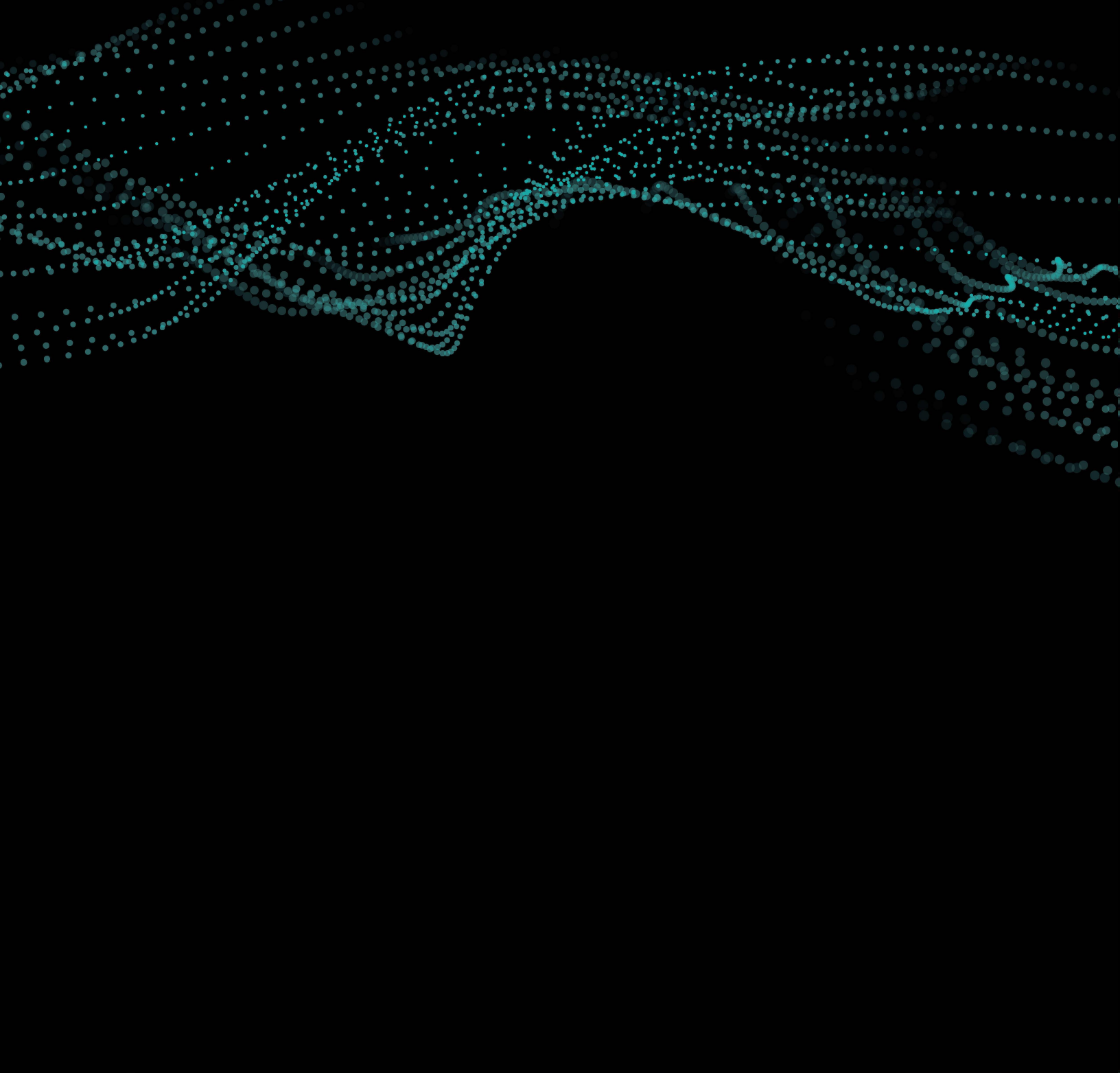
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*EACO vermiculite guideline, January 2015*



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