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# **ASBESTOS-CONTAMINATED SOIL GUIDANCE DOCUMENT**



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**Colorado Department  
of Public Health  
and Environment**

**Hazardous Materials and Waste Management Division  
Colorado Department of Public Health and Environment**

**(303) 692-3300**

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## 1.0 INTRODUCTION

To address asbestos in soil, the Colorado Department of Public Health and Environment's Hazardous Materials and Waste Management Division (the Division) has established specific management requirements for asbestos-contaminated soil under Section 5.5 of the Regulations Pertaining to Solid Waste Disposal Sites and Facilities (6 CCR 1007-2), referred to herein as the Solid Waste Regulations. The applicability of these requirements is discussed in detail in Section 2 of this guidance document.

This guidance document is intended to provide direction to contractors, consultants and property owners and operators who are involved in soil disturbing activities in areas with known or suspected asbestos-contaminated soil, or where asbestos-contaminated soil is discovered. The guidance is meant to assist in compliance with the Solid Waste Regulations, and where applicable, Air Quality Control Commission Regulation No. 8, Part B (5 CCR 1001-10, Part B - Asbestos) referred to herein as Air Regulation No. 8, Part B. However, it is important that the reader be familiar with the regulations in order to understand the context of the information provided in this guidance. This guidance is not meant to modify or replace the promulgated regulations, which may undergo periodic revisions. In the event of a conflict between this guidance and promulgated regulations, the regulations govern.

Remediation of asbestos-contaminated soil is **not required** under Section 5.5 of the Solid Waste Regulations, but may be conducted in accordance with Section 5.5.5 of the Regulations. In addition remediation of asbestos-contaminated soil may be conducted under several corrective action mechanisms, as discussed below. If asbestos-contaminated soil is remediated under one of these mechanisms, the management requirements of Section 5.5 of the Solid Waste Regulations must be incorporated into the remediation plan. Asbestos-contaminated soil remediation projects are those where asbestos-contaminated soil is cleaned up to a specific concentration, or based on specific risk criteria, as defined in a remediation plan. Refer to the regulatory definitions of "management" and "remediation" provided in Section 3, for further guidance. Remediation of asbestos-contaminated soil is discussed further in Section 9 of this guidance document.

Voluntary Cleanup Program – Facilities may voluntarily choose to clean up their sites using the Voluntary Cleanup Program. Authority for the Voluntary Cleanup Program is derived from the Voluntary Cleanup and Redevelopment Act (the Act) (C.R.S. 25-16-301, et seq.) passed in 1994. The purpose of the Act is to "Provide for the protection of human health and the environment and to foster the transfer, redevelopment and reuse of facilities that had been previously contaminated with hazardous substances or petroleum products." Generally, the Voluntary Cleanup Program was intended for sites that were not covered by existing regulatory programs; however waste generated as part of a Voluntary Cleanup project must be managed in accordance with the Solid Waste Regulations and/or the Colorado Hazardous Waste Regulations (6 CCR 1007-3). Additional information regarding this program is available in the Division's "Voluntary Clean-up Roadmap, a How-To Guide" (October 2001, or most recent update).

Corrective Action Plan - Facilities may also voluntarily request to clean up their sites using a Corrective Action Plan, which is prepared and approved by the Division in accordance with Section 100.26 of the Colorado Hazardous Waste Regulations (6 CCR 1007-3). Only facilities subject to corrective action requirements under a permit are excluded from utilizing this process. This program includes a simple process whereby a facility subject to the hazardous waste regulations may initiate the corrective action process without seeking a permit or order. Additional information regarding this program is available in the Division's "RCRA Integrated Corrective Action Plan Guidance Document and Checklist" (January 2000, or most recent update).

Compliance Order on Consent – Cleanup of asbestos-contaminated soil may be conducted under an existing compliance order on consent, under the Colorado Hazardous Waste or Solid Waste Regulations, in which the area of asbestos-contaminated soil may be considered a Solid Waste Management Unit (SWMU), an area of concern (AOC), or a solid waste disposal site. A compliance order on consent may also be used in cases where a) the remedial process is expected to require long-term commitments, b) the proposed cleanup activities necessitate the use of units requiring an order mechanism (e.g., Corrective Action Management Unit, Temporary Unit, or Staging Pile), or c) the proposed remedial activity requires the use of enforceable institutional controls. The facility and Division representatives would negotiate and agree upon the terms of the corrective action elements of the order before it is signed.

Unilateral Compliance Order – A unilateral compliance order, under the Colorado Hazardous Waste or Solid Waste Regulations, may be required in cases where a) there is a serious threat to human health that must be mitigated, b) the facility has demonstrated an unwillingness to perform the necessary actions in response to a serious threat to human health, or c) serious violations of the regulations have been identified by the Division. As the name implies, the Division prepares and issues this legal document with minimal to no input from the receiving facility.

Post-Closure Permits or Post-Closure Order – Cleanup of asbestos-contaminated soil may be conducted under an existing post-closure permit, or an equivalent mechanism such as a post-closure order. These mechanisms are required for permitted or interim status facility upon determining that all hazardous waste or hazardous constituents will not be removed from either the closing regulated unit or the surrounding environmental media. Under post-closure permits and orders, areas of asbestos-contaminated soil would be considered solid waste management units.

It should also be noted that sampling of asbestos-contaminated soil is not required under Section 5.5 of the Solid Waste Regulations; however, the information that can be gained from sampling may be beneficial for many projects. In addition, when conducting remediation under one of the mechanisms discussed above, sampling may be necessary to demonstrate that cleanup objectives have been met.

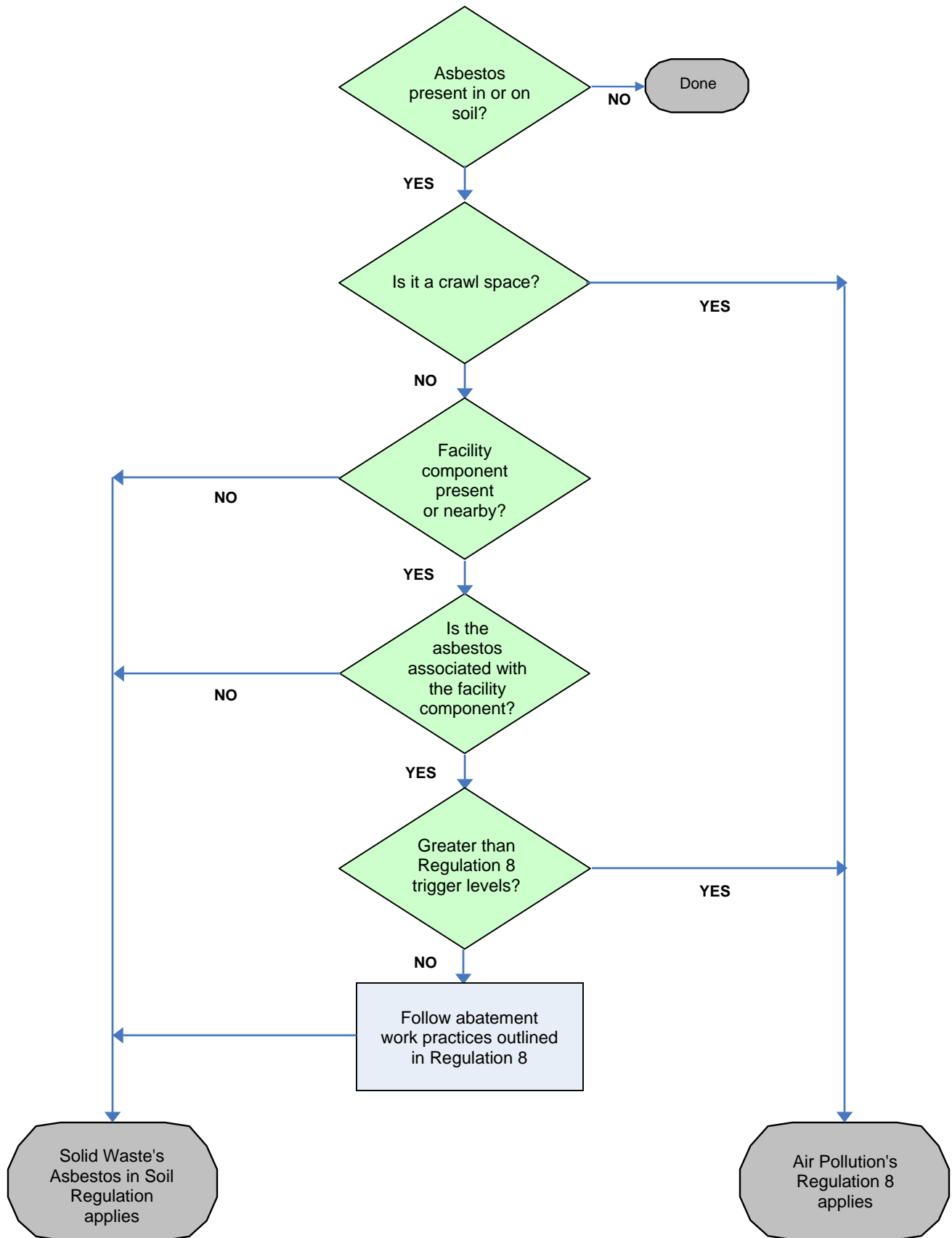
## **2.0 APPLICABILITY OF SOLID WASTE AND AIR REGULATIONS**

### **2.1 Applicability**

As specified in Section 5.5.1 of the Solid Waste Regulations, the following paragraphs detail when the Solid Waste Regulations apply to activities involving asbestos-contaminated soil, and when these activities are regulated under Air Regulation No. 8, Part B. This relationship is also illustrated in Figure 1. It is important to understand that there is nothing in the Solid Waste Regulations that requires an owner or operator to perform soil-disturbing activities, or to remediate asbestos contaminated soil. The regulations include specific requirements that apply *only if* asbestos-contaminated soil is disturbed or will be disturbed. The flow chart presented as Figure 2 illustrates the response sequence for unanticipated discoveries of asbestos-contaminated soil and planned asbestos-contaminated soil management activities subject to the requirements of the Solid Waste Regulations.

- The requirements of Section 5.5 of the Solid Waste Regulations apply to the owner or operator of any property with asbestos-contaminated soil at which soil-disturbing activities are occurring or planned for any area containing asbestos-contaminated soil. Section 5.5 does not apply to asbestos waste disposal areas that have a Certificate of Designation. The requirements of Section

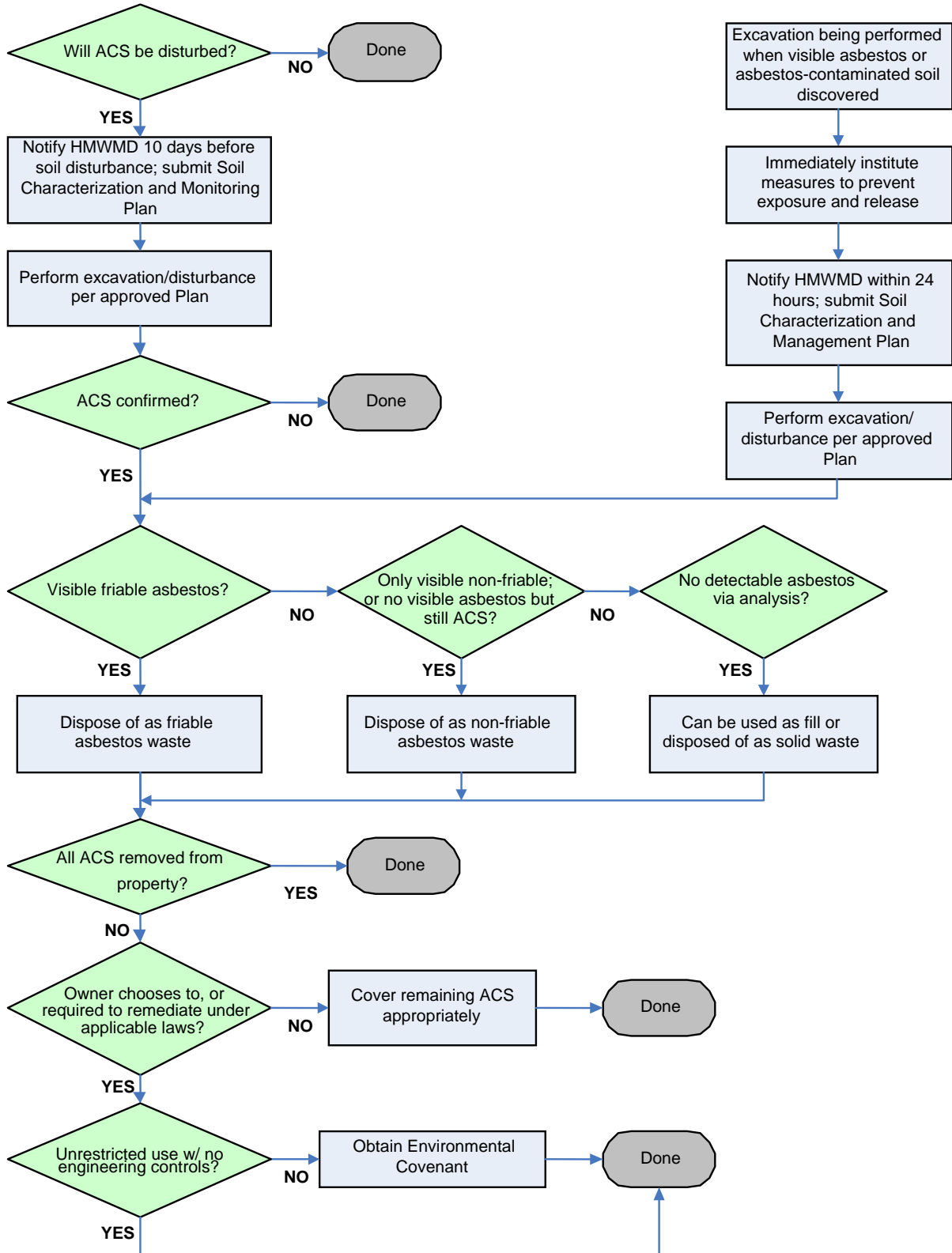
**FIGURE 1**  
**DETERMINATION IF COVERED BY AIR POLLUTION'S REGULATION 8**  
**OR THE SOLID WASTE REGULATIONS FLOW CHART**



**FIGURE 2  
ASBESTOS-CONTAMINATED SOIL (ACS)  
RESPONSE FLOW CHART**

**Planned Asbestos Management Response**

**Unplanned Asbestos Discovery Response**



- 5.5 are triggered when the owner or operator has reason to believe or suspect the presence of asbestos-contaminated soil at a site, (such as through confirmation by analysis of observed material that is suspected as containing asbestos), or has reason to believe or suspect that visible asbestos will be encountered. An owner or operator who has no reason to know of or suspect asbestos-contaminated soil at a site does not have a duty to sample or otherwise investigate for asbestos-contaminated soil prior to commencing excavation, or other soil disturbing activities, at the site.
- Removal of asbestos-containing material on a facility component that is located on or in soil that will be disturbed shall be conducted under Section 5.5 of the Solid Waste Regulations in accordance with work practices in Air Regulation No. 8, Part B, Section III.O, but is not subject to the permit requirements of Air Regulation No. 8, Part B as long as the total quantity of asbestos-containing material is below the following trigger levels:
  - 1) 260 linear feet on pipes,
  - 2) 160 square feet on other surfaces, or
  - 3) The volume equivalent of a 55-gallon drum.

Removal of asbestos-containing material on a facility component with asbestos quantities above the trigger levels is subject to the notification, permit, and abatement requirements of Air Regulation No. 8, Part B, and is therefore outside the scope of Section 5.5 of the Solid Waste Regulations, as provided in Section 5.5.2(B) of the regulations.

- Removal of pieces of asbestos-containing material that are not on a facility component and are located on or in soil that will be disturbed shall be conducted under Section 5.5 of the Solid Waste Regulations in accordance with work practices in Air Regulation No. 8 - Part B, Section III.O. The removal activities would not be subject to the permit requirements of Air Regulation No. 8, Part B.

## 2.2 Exemptions

In accordance with Section 5.5.2 of the Solid Waste Regulations, the following projects are exempt from the requirements of Section 5.5 of the Solid Waste Regulations, but may be subject to other sections of the Solid Waste Regulations or other regulatory programs:

- Non-friable Material Removed From Soil - In situations where the soil contains solely non-friable material containing asbestos that has not been rendered friable, the non-friable material can be removed from the soil and properly disposed of in accordance with Section 5.2 of the Solid Waste Regulations. The surrounding soil would not be considered to be asbestos-contaminated soil and therefore would not be subject to the requirements of Section 5.5 of the Solid Waste Regulations. The determination that a material is non-friable must be made by an asbestos Building Inspector who has been certified in accordance with Air Regulation No. 8, Part B and who has a minimum of six (6) months experience in asbestos-contaminated soil inspections (see Section 8.3 - Worker Training).
- Abatement of Facility Components Under Air Regulation No. 8, Part B - The requirements of Section 5.5 of the Solid Waste Regulations **do not** apply to asbestos abatement of facility components (including pipes, ducts and boilers) conducted in accordance with Air Regulation No. 8, Part B. However, disposal of asbestos must still comply with Sections 5.1 through 5.4 of the Solid Waste Regulations.
- Spill Response Conducted Under Regulation No. 8 - The requirements of Section 5.5 of the Solid Waste Regulations **do not** apply to spill response activities that are subject to the requirements of Air Regulation No. 8, Part B. As above, disposal of asbestos must still comply with Sections 5.1 through 5.4 of the Solid Waste Regulations.
- Ambient Occurrences of Asbestos - The requirements of Section 5.5 of the Solid Waste Regulations **do not** apply to ambient occurrences of asbestos that are not due to site-specific

activities. Ambient occurrences of asbestos may include, but are not limited to, naturally occurring asbestos or the distribution of asbestos from normal wear of automotive products. It should be noted that since sampling for asbestos fibers in soil is not required for asbestos management projects, and the fact that most sites will be identified based on visual identification of asbestos debris, identifying or distinguishing ambient or background concentrations of asbestos from site related asbestos would not typically be necessary. There may be instances where determining ambient/background concentrations may be helpful during a remediation project to support risk-based decisions. Guidance on determining background concentrations of asbestos is provided in Appendix B.

- De Minimis Projects - The requirements of Section 5.5 of the Solid Waste Regulations **do not** apply to projects involving excavations with a total volume of less than 1 cubic yard of soil using low-emission excavation methods such as hand held tools or light equipment. However, disposal of asbestos must still comply with Sections 5.1 through 5.4 of the Solid Waste Regulations.
- Projects by Homeowner - Projects conducted directly by a homeowner at their primary residence, including residential landscaping projects and other private residential soil-disturbing projects conducted after the primary dwelling is built, (e.g. planting trees, digging holes for fence posts, installing sign posts, gardening, other projects done by private individuals at their primary place of residence). This exemption does not apply to projects conducted by a person who resides at a residence that they do not own, or to projects conducted by a person who owns a property that is not their primary place of residence.

The exemption for asbestos abatement projects conducted under Air Regulation No. 8, Part B extends to asbestos debris that may come into contact with soil during demolition of structures with asbestos-containing materials and materials containing trace amounts of asbestos (including trace soil in crawlspaces, loose fill vermiculite, etc) that can legally remain during demolition and be disposed of as normal demolition debris. Any asbestos debris left behind after the completion of a demolition project and subsequent site cleanup would be subject to the requirements of Section 5.5 of the Solid Waste Regulations if disturbed in the future.

### 3.0 DEFINITIONS

The following terms are defined in Section 1.2 of the Solid Waste Regulations, and their use in this guidance document is intended to be consistent with their regulatory definitions. The definitions for friable and non-friable provided below are taken from Air Regulation No. 8, Part B.

**“Adequately wet”** means sufficiently mix or penetrate with liquid to completely prevent the release of particulate material and fibers into the ambient air. If visible emissions are observed coming from asbestos-contaminated soil or asbestos-containing material, then the material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

Guidance on determining when a material is adequately wet can be found in EPA’s *Asbestos NESHAP Adequately Wet Guidance*, EPA 340/1-90-019 (December 1990).

**"Asbestos"** means the asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), amosite (cummingtonite-grunerite), anthophyllite, and actinolite-tremolite.

**“Asbestos-contaminated soil”** means soil containing any amount of asbestos.

**"Asbestos waste"** means any asbestos-containing material whether it contains friable or non-friable asbestos, that is not intended for further use. This term includes but is not limited to asbestos mill tailings, asbestos from pollution control devices, and containers that contain asbestos.

**"Asbestos-containing material"** means any material that contains more than one percent (1%) asbestos by weight, area or volume.

**"Asbestos waste disposal area"** means an area approved for the disposal of asbestos waste at a solid waste facility, including, but not limited to, a trench or monofill.

**"Emergency"** means an unexpected situation or sudden occurrence of a serious and urgent nature that demands immediate action and that constitutes a threat to life or health, or that may cause major damage to property.

**"Facility Component"** for purposes of Section 5.5, means any part of a facility including equipment. For the purpose of this definition, "facility" means (as defined in Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B):

“any institutional, commercial, public, industrial, or residential structure, installation, or building (including any structure, installation, or building containing condominiums or individual dwelling units operated as a residential cooperative, but excluding: residential buildings having four or fewer dwelling units); any ship; and any active or inactive waste disposal site. For purposes of the definition, any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation, or building. Any structure, installation or building that was previously subject to this subpart is not excluded, regardless of its current use or function.”

**"Friable"** means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously non-friable material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

**"Leak tight"** means that solids, liquids, or gases cannot escape or spill out. It also means dust tight.

**"Management"** means the handling, storage, collection, transportation and disposal of solid waste.

**"Mechanical"** means operated or produced by mechanism or machine. This may include, but shall not be limited to, an excavator, backhoe, grader, tiller, auger, or hand shovel.

**"Non-friable"** means material which, when dry, may not be crumbled, pulverized, or reduced to powder by hand pressure.

**"Remediation"** or **"Remediate"** means a cleanup or removal to prevent or minimize the possible current or future release of hazardous substances to prevent an unacceptable threat to present or future public health, welfare or the environment.

**"Site"** or **"solid waste disposal site"** means the location for a facility chosen based upon geologic, hydrogeologic and operational considerations. For the purpose of Section 5.5 of the Solid Waste Regulations "site" means the area or areas where soil-disturbing activities are occurring or will occur.

**"Soil-disturbing activities"** means excavation, grading, tilling, or any other mechanical activity used to disturb the soil.

**“Structurally rigid container”** means a container capable of maintaining its shape when unsupported.

**“Visible emissions”** means any emissions which are visually detectable without the aid of instruments, coming from material containing asbestos, asbestos waste, asbestos-contaminated soil, or from handling and disposal of asbestos waste, material containing asbestos or asbestos-contaminated soil.

**“Working day”** means Monday through Friday and including holidays that fall on any of the days Monday through Friday.

The following definitions are terms that either do not have specific regulatory definitions, or the regulatory definitions have been modified or clarified for use in this guidance.

**“Air Monitoring Specialist”** means a person who performs air monitoring referred to in this guidance and who is certified to perform air monitoring in accordance with Air Regulation No. 8, Part B.

**“Asbestos Building Inspector”** or **“Building Inspector”** means a person certified in accordance with Air Regulation No. 8, Part B, to perform asbestos inspection and sampling, and who has a minimum of six (6) months experience in asbestos-contaminated soil inspections.

**“Asbestos Supervisor”** means a person who has been certified as an asbestos Supervisor in accordance with Air Regulation No. 8, Part B.

**“Asbestos Project Designer”** or **“Project Designer”** means a person who has been certified as an asbestos Project Designer in accordance with Air Regulation No. 8, Part B.

#### **4.0 HISTORICAL REVIEW TO DETERMINE THE POTENTIAL FOR ASBESTOS**

##### **4.1 Site Historical Review**

Prior to disturbance of a soil area, it is recommended that an environmental professional with experience in conducting historical property use assessments review available historic site information to evaluate the potential to encounter asbestos. Depending on the past use of the property, it may be warranted to conduct a Phase I environmental site assessment following EPA’s *Standards and Practices for All Appropriate Inquiries* and ASTM E1527-05 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. At a minimum, it is recommended that information regarding the following potential conditions be reviewed:

- **Historical** site use, including development of site buildings, structures and associated utility corridors on which there is a potential to encounter materials containing asbestos that are potentially within planned pathways of soil disturbance.
- **Past evidence** or information of historical land filling, dumping or grading of potential asbestos and asbestos waste materials.
- **The likelihood of an unexpected discovery** of building(s) and/or structure(s) with the potential of containing asbestos that may be within the pathway of planned soil disturbance.

In instances where the potential to encounter asbestos during excavation is already known, a historical review may not be necessary. Likewise, in situations involving the excavation of existing utility lines,

where the presence or absence of asbestos can be readily confirmed, a historical review may not be warranted.

#### **4.1.1 Historical Sources of Information**

Historical documents and records may include, but are not limited to, the following sources and physical setting documents. It is recommended that document review be at ASTM recommended intervals (typically 5 years, 1 year at change of use or demolitions).

- Facility or site-owner records
- Site-specific foundation, water well and boring and drilling logs, and previous environmental subsurface investigation reports
- Aerial photographs
- Fire insurance maps
- City directories
- Chain of Title documents
- City inspection and land use records
- Municipal and county inspection, occupancy, construction and demolition permit records, and plan review drawings
- Fire response and emergency demolition records
- Federal, state and local agency environmental database records, including locally mapped areas of known landfill and construction waste disposal sites
- Utility corridor construction maps and plans
- USGS, State, and local geologic, and surface soils investigations and maps

It is recommended that historical documents and records reviewed cover a period of time as far back in history necessary to define the first use and development of property, and subsequent uses of the property including redevelopment of property for residential, agricultural, commercial, industrial, utility and governmental purposes. In addition to evaluating the various uses of the property, this review should include an evaluation of historic buildings or structures, and the demolition and disposal practices employed when these buildings or structures were removed. Lack of historical information available for review may necessitate an elevated awareness level for planning and protective measures.

Existing data regarding the current physical setting, including soil borings, trenching, ground penetrating radar (GPR) or other geophysical techniques, and industrial metal detectors may be reviewed by the environmental professional as an additional physical setting informational element to define actual soil conditions. These methodologies may assist in defining the nature of subsurface structure extent, subsurface buried material nature, and historic utility corridor and piping pathways.

In addition to historical documents, interviews with past and present site personnel may provide valuable information regarding past site usage, construction and demolition activities, and on-site disposal and abandonment practices.

#### **4.1.2 Historic Conditions of Concern**

**High potential of encountering asbestos** - A high potential of encountering asbestos will exist where historical information confirms the prior existence of building(s) and or associated structures and utility corridors that potentially contained asbestos and/or asbestos waste materials related to historic dumping, landfilling, or grading of potential asbestos waste materials. A high potential of encountering asbestos would be a “reason to believe or suspect that visible asbestos will be encountered” under Section 5.5.1 (A) of the Solid Waste Regulations, as discussed in Section 2.1 of this guidance.

**Elevated potential of encountering asbestos** - An elevated potential of encountering asbestos may exist but is not definitive, if there is information indicating a potential to encounter materials during subsurface activities, indications of past artificial fill use, or fill use of unknown origin. In addition, the lack of data available during the review process may result in an elevated potential to encounter asbestos. Depending on the information available, an elevated potential for encountering asbestos may be a “reason to suspect that visible asbestos will be encountered” under Section 5.5.1 (A) of the Solid Waste Regulation, and may be the basis for further inquiry or assessment.

**Low potential of encountering asbestos** - A low potential of encountering asbestos exists when physical setting and historic data indicate a minimal potential for past use and or development of the site, and no evidence of past dumping, filling or grading of the site. A low potential for encountering asbestos would *not* be a “reason to believe or suspect that visible asbestos will be encountered” under Section 5.5.1 (A) of the Solid Waste Regulations.

## **5.0 IMMEDIATE ACTIONS UPON UNANTICIPATED DISCOVERY OF SUSPECTED ASBESTOS-CONTAMINATED SOIL**

This section, in conjunction with the following Section 6.0, describes the immediate and interim actions to be implemented when unanticipated contact with asbestos-contaminated soil, subject to Section 5.5 of the Solid Waste Regulations, occurs during active construction activities (refer to Sections 2.1 and 2.2 of this guidance for applicability of the Solid Waste Regulation). When suspect asbestos-contaminated soils or building debris are discovered during construction activities, the critical requirement is to avoid generating or being in direct contact with airborne soil, thereby limiting potential exposure to asbestos fibers. The following outlines procedures for minimizing the potential release of airborne asbestos when suspect asbestos material is discovered.

- Stop work immediately upon encountering material that is suspected of containing asbestos.
- Demarcate area suspected of containing asbestos with barrier tape, or other means, and provide site access control. Access can be prevented by means of fencing or security personnel.
- Disturb soil as little as possible to perform any initial characterization activities (as described in Section 7, “Site Characterization”).
- Wet area immediately with water prior to performing any characterization activity that will disturb the material (visual inspection does not require wetting). Maintain wet conditions throughout site characterization activities. If leaving the site unattended, cover the disturbed soil with a layer of 6-mil polyethylene (poly), tarps, or spray with magnesium chloride solution in sufficient amounts to wet the soil to prevent drying and dust generation.
- A layer of 6-mil poly may be used to prevent cross contamination onto clean soils during initial characterization activity by placing the poly on the ground and then placing the contaminated soil directly on the poly.
- Generate no visible emissions (dust) during characterization activities.
- Contact an asbestos Building Inspector with a minimum of six (6) months experience conducting asbestos-contaminated soil inspections and certified in accordance with Air Regulation No. 8, Part B to collect samples of the suspect asbestos materials according to the procedures provided in Section 7 of this guidance. Samples must be analyzed by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited Laboratory, administered by the National Institute of Standards and Technology (NIST), using the Polarized Light Microscopy (PLM) Method (Method – EPA/600/R-93/116) to determine if any asbestos fibers are present. Alternatively, suspect material may be assumed to contain asbestos, thus eliminating the need to conduct sampling and analysis.

- Assume clothing and equipment that has come into contact with the suspect asbestos is contaminated until/unless analytical results indicate the material does not contain any asbestos. Workers and equipment should be decontaminated on site and dirt and debris should not leave the immediate work area. Heavy equipment should be left on site after decontamination until analytical results are received. The following procedures can be modified as appropriate based on project scale and the potential level of exposure:
  - Decontaminate workers by removing any visible soil and dust with damp wipes or cloths, or by the use of a HEPA (high efficiency particulate air) filter equipped vacuum. Place wipes and cloths in a plastic bag and label as “Investigative waste”, “date”, and “company name/your name”. If additional clothing is available, clothes should be changed and potentially contaminated clothes should be bagged separately from wipes and cloths (it may be possible to clean these clothes if it is determined that asbestos is present).
  - Decontaminate equipment by removal of gross soils and dust, then washing the equipment. Decontamination of equipment should be conducted by a certified asbestos worker wearing proper personal protective equipment (PPE). Materials used for decontamination should be bagged and labeled as above. Decontamination rinse water should be collected and filtered to 5 microns prior to disposal off site, or prior to use for wetting of asbestos contaminated areas that will be removed (not allowed for worker decontamination water). If areas where decontamination water has been applied are not going to be excavated prior to drying, the surface must be covered or stabilized until excavation occurs to prevent the emissions of any asbestos fibers that were not removed during filtration. If disposal of decontamination water to the sanitary sewer is anticipated, rinse water should be filtered to 5 microns, or in accordance with local requirements if such requirements are more stringent.
  - Based upon analytical results of suspect materials, if asbestos is present (or assumed to be present if sampling is not conducted), dispose of bags by double bagging and disposing of as asbestos waste in a properly permitted landfill. If analytical results indicate that no asbestos is present, bags can be disposed of as non-asbestos solid waste.
- Notify the Division as soon as possible, but no later than 24 hours after discovery of visible material containing asbestos in the soils or asbestos-contaminated soil, unless the activity is exempt under Section 5.5.2 of the Solid Waste Regulations (see Section 2.2 of this guidance). In accordance with the Solid Waste Regulations, the notification must, at a minimum, include:
  - property location.
  - general site description.
  - description of activities resulting in the discovery of asbestos-contaminated soil.
  - description of type and amount of material containing asbestos or asbestos-contaminated soil encountered.
  - description of any access and emission controls already implemented at the site.
  - property representative’s name and phone number.
  - contact name and phone number for the party performing soil-disturbing activities.

Verbal notification can be provided by calling the Division Customer Technical Assistance Line at (303) 692-3320. If after hours, leave a detailed message that includes the information listed above. Verbal notifications must be followed up by a written notification. Written notification can be submitted via facsimile to (303) 759-5355, via email to [comments.hmwmnd@state.co.us](mailto:comments.hmwmnd@state.co.us), or by any other means that will ensure that the notification is received by the Division within 24 hours. A sample notification form is provided in Appendix A.

- Submit a Soil Characterization and Management Plan, in accordance with Section 5.5.4(B) of the Solid Waste Regulations, to the Division for review and approval. The elements of a Soil Characterization and Management Plan are discussed in detail in Section 8, “Management of Asbestos-Contaminated Soil.”

To minimize potential delays, site owners and operators may proactively collaborate with the Division in advance of any soil-disturbing activities to jointly develop approved standard procedures that site owners and operators will implement as needed for all future applicable soil-disturbing activities. These standard operating procedures, once approved by the Division, satisfy the requirement for a Soil Characterization and Management Plan.

## **6.0 INTERIM ACTIONS TO PREVENT RELEASE OF AND/OR EXPOSURE TO ASBESTOS FIBERS**

Upon confirmation of asbestos in soil, site characterization, as discussed in Section 7.0 of this guidance, may be necessary. Depending on the goals of the project and the nature of the asbestos material encountered, site characterization may be as simple as determining the extent of visible material and its friability, or may involve a more thorough investigation of the nature and extent of material present. Prior to and during the site characterization, and until final actions are taken in accordance with an approved Soil Characterization and Management Plan or approved standard procedures, the following interim actions should be implemented, as necessary, based on the nature and friability of material and the size and location of the project, to prevent release of and/or exposure to asbestos fibers.

- Maintain adequately wet conditions on the site until stabilized.
- Apply stabilizing agents to the soil as needed (note that some stabilizers like magnesium chloride will not work with water).
- Take measures, as necessary, to address asbestos-contaminated soil that may have been tracked to other areas by contaminated equipment. These measures could include stabilizing or covering these areas until they can be addressed under an approved Soil Characterization and Management Plan, or by conducting immediate spill response activities such as cleaning using wet methods and/or a HEPA equipped vacuum methods.
- Construct wind fences or other wind barriers as appropriate.
- Construct barriers around activity areas.
- Cover soil with 6-mil poly, or equivalent, or spray the soil with magnesium chloride or other stabilizer. Securely fasten poly sheeting to prevent removal by the wind.
- In addition to the 6-mil poly, an additional liner construction of reinforced polyethylene or a product similar in strength and durability can be applied to an adjacent soil surface to prevent cross contamination by truck or heavy equipment movement.
- Reduce traffic speeds for equipment, trucks and cars through adjacent exposed soil areas.
- Clothing and equipment that have come into contact with the asbestos-contaminated soils should be considered contaminated. Workers and equipment should be decontaminated on site, and dirt and debris should not leave the immediate work area. Decontaminate worker(s) by removing any visible soil and dust with damp wipes or cloths or by the use of a HEPA filter equipped vacuum. Place wipes, cloths and disposable personal protective equipment (PPE) in a plastic bag and label as “Asbestos Wastes”, “date”, and “company name/your name.”
- Place equipment on a plastic barrier to collect decontamination water for filtering prior to disposal. Decontaminate equipment by removal of gross soils and dust, then wet wash equipment. Again, materials used for wiping should be bagged and labeled as stated above.
- Dispose of bagged decontamination waste materials as asbestos waste in a properly permitted landfill.

- Decontamination water should be filtered to 5 microns prior to disposal off site, or in accordance with local requirements if such requirements are more stringent, prior to disposal into a sanitary sewer.

## **7.0 SITE CHARACTERIZATION**

Prior to commencing work in areas with known or suspected asbestos in soil, it is important to understand the nature and distribution of materials that may be encountered. This knowledge can aid in identifying areas where asbestos may be disturbed during excavation, allowing for the potential presence of asbestos to be considered in any plans for development. For instance, development can be planned in such a way that areas with asbestos are not disturbed. The plans could include pavement or open space over areas with asbestos in the subsurface, thus avoiding the need to disturb and manage asbestos-contaminated soil. Alternatively, areas with asbestos may be intentionally disturbed in order to remove asbestos and reduce potential future liability. Adequate characterization and planning up-front to properly manage asbestos-contaminated soil may reduce or eliminate project delays and reduce unforeseen costs.

As part of the site characterization process, the owner or operator of a site may decide to perform surface and/or subsurface sampling to confirm or deny the presence of asbestos and to define the extent of any asbestos-contaminated soil encountered. The investigation design and data quality objectives will be largely influenced by site-specific variables and project-specific goals. For example, an investigation to determine the extent of asbestos debris from a known feature, such as a former structure or a disposal area, may entail a less rigorous sampling program than would an investigation to determine the extent of a scattered debris field. Similarly, current or future property use considerations may influence the investigation design. For instance, small grid spacing and tight sample density might be appropriate in areas of future residential development, whereas larger grid spacing and lower sample density might be used in areas where subsurface soil will remain undisturbed. When designing a site characterization program and making decisions as to whether or not to collect samples, it is important to keep the following key questions in mind:

- what is the investigation intended to demonstrate?
- what is the current site model or hypothesis, and how will data be used to verify, disprove or modify the site model?
- how will data gathered be used to make management or remedial decisions?
- what confidence level is necessary to aid in decision-making?

Due to the wide range of variables that could influence investigation design and data quality objectives, this guidance focuses on investigation methodology rather than attempting to provide recommendations on investigation design parameters such as grid spacing or sample density. As part of the Soil Characterization and Management Plan review process, the Division will work with property owners/operators, and their contractors and consultants, to establish a characterization program that is capable of addressing site-specific factors and meeting project-specific goals.

It should be noted that sampling of asbestos-contaminated soil is not required under Section 5.5 of the Solid Waste Regulations. However, sampling may be required at remedial projects conducted under one of the other regulatory programs discussed in Section 1 of this guidance.

### **7.1 General Site Description**

Prior to commencing any site characterization activities, it is recommended that a pre-work survey be conducted to assess existing site conditions. This survey should identify any hazards that may be present and that may affect the health and safety of those conducting characterization activities, such as working

near overhead and underground utilities. All utilities should be field located prior to commencement of site activities. No drilling or excavation should begin without first notifying the Utility Notification Center of Colorado (UNCC) in accordance with the Colorado One Call Law (C.R.S. 9-1.5-101, et seq.).

## 7.2 Type(s) and Condition of Asbestos Material

There are several common scenarios in which asbestos-contaminated soil may be encountered at a site. These include redeveloping urban or otherwise previously developed areas, disturbing former disposal or demolition areas, upgrading utility systems, and disturbing areas where contaminated soil has been disposed. The types of asbestos materials that may be encountered include, but may not be limited to:

### Sample List of Suspect Asbestos - Containing Materials

Cement Pipes	Elevator Brake Shoes
Cement Wallboard	HVAC Duct Insulation
Cement Siding	Boiler Insulation
Asphalt Floor Tile	Breaching Insulation
Vinyl Floor Tile	Ductwork Flexible Fabric Connections
Vinyl Sheet Flooring	Cooling Towers
Flooring Backing	Pipe Insulation (corrugated air-cell, block, etc.)
Construction Mastics (floor tile, carpet, ceiling tile, etc.)	Heating and Electrical Ducts
Acoustical Plaster	Electrical Panel Partitions
Decorative Plaster	Electrical Cloth
Textured Paints/Coatings	Electric Wiring Insulation
Ceiling Tiles and Lay-in Panels	Chalkboards
Spray-Applied Insulation	Roofing Shingles
Blown-in Insulation	Roofing Felt
Fireproofing Materials	Base Flashing
Taping Compounds (thermal)	Thermal Paper Products
Packing Materials (for wall/floor penetrations)	Fire Doors
High Temperature Gaskets	Caulking/Putties
Laboratory Hoods/Table Tops	Adhesives
Laboratory Gloves	Wallboard
Fire Blankets	Joint Compounds
Fire Curtains	Vinyl Wall Coverings
Elevator Equipment Panels	Spackling Compounds

It is important to observe the current condition of the materials encountered to determine whether they are friable or non-friable, and whether the friability of the material could be altered by planned site activities. Determinations regarding the type of asbestos material encountered and its friability must be made by an asbestos Building Inspector certified in accordance with Air Regulation No. 8, Part B who has at least six (6) months experience conducting asbestos-contaminated soil inspections.

### **7.3 Worker Training**

As described in Section 8.3 of this guidance, the Solid Waste Regulations include minimum training requirements that apply to all persons performing soil-disturbing activities in areas with asbestos-contaminated soil. In addition to these training requirements, it is suggested (and in some cases may be required by other regulations) that personnel overseeing, directing, inspecting and/or handling asbestos or asbestos-contaminated soil (including suspect asbestos) during characterization activities have the following:

- a current United States Environmental Protection Agency (EPA)/Asbestos Hazard Emergency Response Act (AHERA) 32-hour Worker, 40-hour Contactor/Supervisor, or 24-hour Building Inspector accreditation.
- a current EPA/AHERA 8-hour refresher course certification.
- current Colorado asbestos certification for the appropriate discipline.
- a current annual physical with medical release/respirator usage form and respirator fit test.
- all required certificates and licenses should be in accordance with the provisions set fourth in Air Regulation No. 8, Part B.

It is suggested that ancillary personnel not directly performing field work, such as quality assurance/quality control (QA/QC) oversight staff, management and owner project staff, attend an asbestos awareness class prior to visiting the site.

Upon initial discovery of any suspected asbestos, field personnel should immediately notify a supervisor or other person responsible for making project decisions. The supervisor, or other person with authority, should take actions necessary to ensure that the suspect material is not disturbed while waiting for the arrival of appropriately trained personnel (as discussed in Section 8.3), including an asbestos Building Inspector to evaluate the material encountered. Trained personnel should stake, flag, or otherwise demarcate suspect materials and notify key personnel such as the project manager, prime contractor, owner or other responsible entity regarding the location of the suspect materials and the necessary precautions to be taken. Crews working in the vicinity should be warned to avoid that area until directed otherwise. All personnel working on site should be advised and directed to not disturb areas where suspected or known asbestos material is present. Personnel driving onto the site to perform inspections or an oversight roll should be notified of suspect or known asbestos-containing material locations and directed to not drive over or otherwise disturb those areas. In addition, personnel accessing the site should take all necessary measures to minimize tracking of asbestos-contaminated soil. This may include wearing personal protective equipment, as appropriate, and implementing worker and equipment decontamination procedures.

### **7.4 Assessing the Presence and Extent of Asbestos**

This procedure provides technical guidance and methods that can be used to identify and inspect both surface and subsurface soils when material containing asbestos is discovered during excavation projects. The purpose of this protocol is to allow the inspectors to perform investigations while avoiding any release of fugitive dust.

- Vehicles entering the area must avoid causing the release of fugitive dust. Vehicle operators should be observant and drive in a slow, cautious manner.
- Should the operators observe suspected asbestos materials, the operator must alter course as necessary in order to avoid direct contact.

- If drilling equipment is used, the point of operation must be misted to eliminate airborne emissions, especially during auger/drill extraction. The auger should be rinsed after it is removed from a soil boring.
- Prior to vehicles exiting the area, vehicle wheels should be decontaminated. Rinsate water should be collected and filtered to 5 microns prior to disposal off site, or prior to use for wetting of asbestos-contaminated areas that will be excavated at a later date. Surfaces where decontamination water has been applied must be covered or stabilized until excavation occurs to prevent the emissions of any asbestos fibers that were not removed during filtration. If disposal into a sanitary sewer is anticipated, the water should be filtered to 5 microns, or in accordance with local requirements if such requirements are more stringent.
- Personnel should take measures to minimize tracking asbestos-contaminated soil, including donning appropriate personal protective equipment, and implementing worker decontamination procedures.

The following materials may be needed during the course of discovery, inspection or remediation of soil containing asbestos:

- Appropriate field monitoring instruments (high and low flow pumps, personnel pumps, wind meters, magnifying lens or hand lens, phase contrast microscopy (PCM) microscopes (if trained personnel are onsite), etc)
- Camera
- Field log books
- Personal protective equipment (PPE) and cold weather gear as required.
- Tape measure and pin flags
- Garden trowel(s) and/or rakes
- Garden sprayers
- Marked 6-mil disposal bags, sample bags, generator labels, and manifests
- Suitable lab/sample reading area (if trained personnel are onsite)
- Surface soil sample field data sheets and chain-of-custody forms
- Diagrams and/or GPS equipment

#### **7.4.1 Investigation Techniques**

The following techniques can be employed during investigations to confirm or deny results of historical review. Emissions control measures should be employed during investigations where asbestos is suspected. In addition, personnel accessing the site should take all necessary measures to minimize tracking of asbestos-contaminated soil. This may include wearing personal protective equipment, as appropriate, and implementing worker and equipment decontamination procedures. It should be noted that sampling of asbestos-contaminated soil is not required under Section 5.5 of the Solid Waste Regulations. However, sampling may be required at remedial projects conducted under one of the other regulatory programs discussed in Section 1 of this guidance.

##### **7.4.1.1 Surface Investigation Techniques**

**Visual inspections** for surface occurrence of suspect asbestos material should be conducted by certified asbestos Building Inspectors, who have at least six (6) months experience conducting asbestos-contaminated soil inspections using the procedures provided below. The number and size of grids should be determined based on the size of the area to be investigated, any information available regarding potential presence and distribution of asbestos, and the manner in which it came to be located there. For example, if the material appears to have been disposed of in one location the grid size may be scaled

relative to that disposal area; however, if the material appears to be randomly distributed, the grid size may need to be altered to reflect this random distribution, in order to be truly representative of the contamination.

- Conduct a shoulder-to-shoulder visual inspection of each grid. This can be done by multiple inspectors at an arms-length apart inspecting the surface together or a single inspector performing transverse inspections in two directions.
- Flag or demarcate location of any suspect asbestos material discovered in the grid. This may be done by using pin flags or paint, and may be logged into a GPS unit
- If sampling is conducted, care should be taken to ensure that suspect asbestos material is adequately wetted to prevent visible emissions during the sample collection process.
- Collect a sample of suspect asbestos material following the sampling and analytical procedures in Section 7.5 below.
- If no visible suspect material is present, the inspector should note that observation on a site inspection form or field log.

#### 7.4.1.2 Subsurface Investigation Techniques

**Drilling** methods can be used to assess subsurface occurrences of asbestos. If possible, drilling should be conducted using low emissions techniques such as hand augering or direct push methods. The number and location of borings should be determined based on the size of the site and any information available regarding potential presence and distribution of asbestos, and the manner in which it came to be located there. As discussed above, if the material appears to have been disposed of in one location, only a small number of borings may be needed to characterize the disposal area; however, if the material appears to be randomly distributed, a greater number of borings may be needed to reflect this random distribution in order to adequately characterize potential area(s) of contamination. The following procedure can be used to assess subsurface asbestos:

- It is recommended that auger holes be drilled to a depth that will penetrate native (undisturbed) soil by at least six (6) inches (to verify identification of native material), or to the anticipated depth of a planned excavation. Native soil can be identified based on geotechnical information (i.e., whether soil is consolidated or unconsolidated) and best professional judgment. However, because the identification of native soil is often difficult, this identification should be made by a person who is experienced in performing lithologic evaluations and is familiar with local lithology.
- Care should be taken to ensure that suspect asbestos material is adequately wetted to prevent visible emissions during the inspection and sampling process.
- All soil cores should be visually inspected to identify the presence of visible suspect asbestos material. The presence or absence of suspect asbestos should be noted on the soil sampling field log. Any suspect asbestos material present should be sampled and analyzed in accordance with the procedures in Section 7.5 below.
- The presence of asbestos fibers in soil can be assessed by collecting composite soil samples from each soil boring. Composite samples should be made up of five (5) to ten (10) aliquots per soil boring. Soil samples should be collected and analyzed in accordance with the procedures in Section 7.5 below.
- Soil cuttings containing asbestos-contaminated soil should be containerized and disposed of in accordance with the disposal requirements discussed in Section 8.9.4 of this guidance.

**Potholing or trenching** can be used to visually assess the presence of suspect asbestos material and to facilitate sample collection. Care should be taken to ensure that soil and any suspect asbestos material are

adequately wetted to prevent visible emissions during investigation and sampling activities. Sample collection should be conducted as discussed in Section 7.5.1.2 of this guidance. The following process can be used when conducting potholing or trenching.

- Establish a grid pattern for investigational pits (“potholes”) or trenches to assess the area of future soil-disturbing activities or remediation. Conduct a subsurface visual investigation for suspect debris, by digging potholes or trenches at each investigation location. Dig potholes or trenches to a depth of future excavation, or to a depth where there is a high degree of confidence that “native” or “undisturbed” soil is encountered. Flag, photograph and sample any material suspected of containing asbestos or assume material contains asbestos.
- Continue potholing or trenching incrementally in an outward direction from the last piece of debris found, until no suspect debris is noted in any of the pits. Once the outer boundary of the debris field is established, additional potholes or trenches may be required to confirm the extent of debris.
- If soil piles derived from trenching or potholes suspected of containing asbestos are stored on site, they should be covered with 6-mil plastic or sprayed with a stabilizer such as magnesium chloride.
- If soils derived from trenching or potholes suspected of containing asbestos are temporarily returned to the excavation, they must be covered or stabilized to prevent emissions, and they must later be removed and disposed of in accordance with the disposal requirements of Section 5.5.7 of the Solid Waste Regulations, as discussed in Section 8.9.4 of this guidance.
- If no suspect materials are encountered during potholing or trenching, or if analysis of suspect materials confirms that they do not contain asbestos, the soil may be used as backfill. This assumes that there is no “reason to know” of asbestos fibers in soil based on site history and an absence of visible asbestos material (refer to Section 2.0 of this guidance regarding applicability of the Section 5.5 of the Solid Waste Regulations).

**Ground Penetrating Radar (GPR), Electromagnetic (EM)** or other geophysical techniques may be useful tools to detect different soil conductivities or the presence of buried objects, which may suggest previous earthmoving activities or disposal and abnormal fill areas.

## **7.5 Sampling and Analysis**

The sampling and analytical procedures presented in this section are based on techniques that have been used to characterize asbestos in soil at various sites throughout Colorado. As additional projects emerge, and experience at sites with asbestos-contaminated soil increases, these sampling and analytical techniques may be refined or modified. In general, sampling and analysis methods should meet data quality objectives and address the heterogeneous nature of contamination

### **7.5.1 Sampling Procedures**

#### **7.5.1.1 Sampling Suspect Asbestos Material**

The following procedures are recommended for the collection of samples of suspect asbestos material identified during surface or subsurface sampling:

- Samples of suspect asbestos material shall be placed in appropriate sample containers such as sample bags or jars.
- Care should be taken to ensure that suspect asbestos material is adequately wetted to prevent visible emissions during the sampling process.

- A field sampling form or log book entry should be maintained for each sample. The form or log book entry should contain the location, date and time of each sample, a description of the type of and friability of any suspect material encountered and any observations made during sample collection.
- Proper chain-of-custody protocols should be followed for all samples collected.

#### **7.5.1.2 Surface Soil Sampling**

The following procedures can be used for the collection of surface soil samples:

- Using the grids established for visual inspections (discussed above), collect five (5) to ten (10) random aliquots of surface soil per grid. The actual number of aliquots may vary depending on the size of the area and other site conditions. Depending on the source and distribution of asbestos, and the results of the visual inspections, sampling of all grids may not be warranted.
- Sample aliquots should be collected using a scooping device (stainless steel spoon or equivalent), and transferred to a composite sample container.
- When all aliquots have been collected, the composite sample container should be sealed and labeled with a sample number unique to the grid from which the sample was collected. The sample should be homogenized by the laboratory prior to analysis.
- A field sampling form or log book entry should be maintained for each sample. The form or log book entry should contain the location, date and time of each sample, a description of the type of and friability of any suspect material encountered, and any observations made during sample collection.
- Proper chain-of-custody protocols should be followed for all samples collected.

#### **7.5.1.3 Subsurface Soil Sampling – Potholes, Trenches, Drilling/Soil Borings**

The following procedures can be used for the collection of subsurface soil samples from potholes, trenches or soil borings:

- Collect a composite sample made up of five (5) to ten (10) aliquots representative of the pothole, trench or soil boring. The actual number of aliquots may vary depending on the depth of sampling, the depth at which asbestos is anticipated to be encountered, and the conditions observed. In addition, it may be warranted to collect separate samples from various strata, with aliquots collected from individual strata, to better characterize observed conditions.
- Care should be taken to ensure that suspect asbestos material is adequately wetted to prevent visible emissions during the sampling process.
- Sample aliquots should be collected using a scooping device (stainless steel spoon or equivalent), and transferred to a composite sample container.
- When all aliquots have been collected, the composite sample container should be sealed and labeled with a sample number unique to the boring from which the sample was collected. The sample should be homogenized by the laboratory prior to analysis.
- A field sampling form or log book entry should be maintained for each sample. The form or log book entry should contain the location, date and time of each sample, a description of the type of and friability of any suspect material encountered, and any observations made during sample collection.
- Proper chain-of-custody protocols should be followed for all samples collected.













































































































