VI. Soil Interim Controls

How To Do It

1. **Plan Soil Interim Controls.**

   - ✦ Select appropriate soil interim controls, which may include soil alterations, soil surface coverings, land use controls, reduction of soil tracking, or drainage and dust controls.
   - ✦ Prepare a site plan of the yard, showing the soil lead hazard controls. Retain plans for use in ongoing monitoring.

2. **Contain and dampen dust.** Prepare worksite in accordance with guidance in Chapter 8. Use water to contain dust during the work, and clean play equipment.

3. **Establish soil alteration.** Impermanent surface coverings include grass (as seed or sod), other ground covers (e.g., ivy), artificial turf, bark, mulch, and gravel. If the area to be controlled is heavily traveled, impermanent surface coverings, such as grass, are not appropriate.

4. **Put soil surface coverings in place.**

   - ✦ If grass is selected, consult with the local agriculture extension service, or a reputable local nursery, to determine what grasses are appropriate for the locale, soil type, and sun/shade characteristics. Properly prepare the soil prior to seeding or sodding.
   - ✦ If mulch or bark is selected, apply the covering 4-6 inches deep (3 inches is more appropriate for gravel). New bark, gravel, or other materials should not contain more than 200 µg/g of lead, if possible, and never more than 400 µg/g.
   - ✦ If live ground covers (including grass) are selected, it is imperative that they are properly watered during the first 3 months and adequately maintained thereafter. Automatic sprinkler systems are appropriate for large properties.
   - ✦ If the soil is in a public recreation area, comply with Consumer Product Safety Commission standards on acceptable surface coverings in play areas.

5. **Install land use controls.** Land use controls include fencing, warning signs, changes in administrative practices, creation of alternative play areas (such as decking), and thorny bushes.

6. **Drainage and dust controls.** Control water erosion by proper grading to pitch the slope away from the building and installing drainage channels (drainage channels may need to be fenced or covered if they are accessible). Control wind erosion by periodic watering, windbreaks, or foot traffic controls.

7. **Reduce dust tracking.** Provide walk-off doormats at all entryways to reduce the tracking of contaminated dust and soil into the dwelling.

8. **Perform ongoing monitoring and maintenance.** Perform ongoing monitoring and maintenance of soil coverings and land use controls. If ongoing monitoring shows that bare soil remains, or reappears within 12 months of an interim soil control, the interim controls are not effective. Soil abatement should be conducted (see Chapter 12), unless other interim controls can be shown to be effective for the specific site.

9. **Reevaluation.** If required by regulation or the property owner or manager's preference, conduct reevaluations every two years in accordance with guidance in Section VII of Chapter 5.

A. Definition of Soil Lead Hazards

A soil lead hazard in residential property is bare soil that contains total lead equal to or exceeding:

- 400 parts per million (or µg/g) for play areas frequented by children under 6 years of age, or
- 1,200 parts per million (or µg/g) for other parts of the yard including the dripline/foundation area in non-play areas.

These values are from the federal lead hazard standards rule (at 40 CFR 745.65(c)). State and local standards may vary; if lower, they apply to the housing.

EPA does not provide for a *de minimis* area of bare soil outside the play area that can exceed the 1,200 µg/g standard, such as the 9 square feet per property that HUD had incorporated into its Lead Safe Housing Rule (24 CFR 35.1320(b)(2)(ii)(B)) issued 1½ years before the EPA issued the lead hazard standards rule. EPA noted that it had no analysis or data that relate the amount of bare soil to risk, and the incremental cost of including soil testing in a risk assessment is small. As noted in Chapter 5 of these *Guidelines*,

> "However, EPA highly recommends using the HUD Guidelines for risk assessment…. This would avoid declaring very small amounts of soil to be a hazard in the non-play areas of the yard. This would also help target resources by eliminating the need to evaluate soil or respond to contamination or hazards for properties where there is only a small amount of bare soil."

Once soil sampling establishes that a yard has soil lead hazards, it can be useful to create a map of soil lead concentrations in the yard, such as by using an XRF analyzer that is capable of direct measurement of soil lead concentrations (EPA, 2001a), or by soil sampling and analysis (see Chapter 5, Sections II.C and IV, respectively). This information can be useful for developing a customized interim control plan for the particular yard.

B. Temporary and Permanent Soil Treatments

Interim measures for controlling soil lead hazards include surface coverings with grass, gravel, mulch, wood chips, or similar materials, or land use controls, such as fences, thorny bushes, or decks, for preventing contact with the contaminated soil. These interim controls are designed to temporarily reduce exposure. How long they remain effective depends on many factors, including the durability and maintenance of the cover, amount or degree of foot traffic, and climate.

Soil abatement measures are described in Chapter 12, Section V. If the control measure consists of replacing soil that is a soil-lead hazard (see Section A, above) with soil of acceptable lead levels, or includes installing a permanent cover, such as asphalt or concrete, the method is classified as abatement.

C. Types of Interim Control Measures for Soil

Five types of measures may be used as part of an interim control plan for soil. They are:

- Measures that alter the contaminated soil.
- Measures that alter the surface cover.
- Land use controls.

- Measures that reduce soil tracking
- Measures to reduce offsite drainage or dispersal of the contaminated soil.

Each of these activities should be carried out in a manner that prevents further dispersal of the contamination and prevents the area undergoing the interim control treatment from being contaminated in the process. Work practices for soil interim controls are similar to those for soil abatement and are described more fully in Chapter 12, Section V.

1. Soil Alteration

Interim controls usually involve some alteration of the soil. Examples include surface cultivation, additives, or rototilling clean soil into existing soil to assist in establishing ground cover (e.g. grass, ivy). Grading of the soil is sometimes needed to assure proper drainage. Typically surface alteration is not effective enough to be used as the sole interim control measure. Tilling and mixing the soil to a depth of at least 8 inches may be effective. The addition of clean soils and compost can be used to reduce the lead concentration of vegetable garden soils that are only slightly above the recommended maximum 400 ppm lead concentration, however, for highly contaminated garden soils the contaminated soil should be removed and replaced with clean soil or the garden should be relocated.

2. Soil Surface Cover

The most common form of soil interim control is surface covering that creates a barrier between leaded soil and children. Typical materials include bark mulch, pea gravel, crushed stone, grass seeding, sod, other live ground covers (e.g., juniper, shrubs, ivies), and paving stones. Except with installations of grass seed or sod, a water permeable landscape fabric should always be used to create a barrier between the soil and the installed material. Landscape fabric controls for weeds, creates a clear barrier to leaded soil, and visually signals when the installed material needs to be replenished.

The choice of a covering for a particular area depends on the climate, expected use, planned maintenance, and aesthetic preferences. For aesthetic as well as practical reasons, a property owner may choose to improve the surface cover over an entire soil area even though only a portion is bare.

The success of grass and other live ground covers is dependent on proper planting, adequate water and sunlight, regular maintenance, and most importantly, the ability to control the use of the area. In high traffic areas use of grass as an interim control is unlikely to succeed. Where access to an area can be controlled, or where use is expected to be limited, grass and other live ground covers can be successful interim controls. Some ground covers, such as juniper bushes, can also effectively limit traffic through an area. Shade tolerant ground covers such as ivies are better suited than grass for areas that receive little sunlight.

Before using grass or live ground covers as an interim control measure, a property owner should consult with a lawn care professional about soil preparation, appropriate grasses and plants to use, and future maintenance requirements. The county cooperative extension service or a reputable local nursery may be contacted for advice on types of grass or other ground cover to be used in specific geographic areas and for specific soil types, slope, and sunlight conditions. Table 11.6 offers a brief summary of grass types and their suggested uses.

The local office of the U.S. Department of Agriculture's Natural Resources Conservation Service (***http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home***) may also be able to provide advice about soil conditions in a specific geographic area. An owner of a large property may consider installing a sprinkler system to improve the maintenance effort. In any event some type of hose and sprinkler system should be made available.

An owner should consider whether sod or seeding is more appropriate when planting grass. Both grass seed and sod require restrictions on foot traffic until root systems and stems become established. Newly laid sod requires at least 2 weeks, while grass seed requires 1 to 2 months (Lane Publishing, 1989; Maryland Cooperative Extension, 1994). Sod can be laid during most of the year (as long as the ground is not frozen) and requires less initial care. However, sod is more expensive than seeding and is less likely to develop the deep root systems that will allow the grass to withstand regular wear and tear. It is best to lay sod during the growing season.

At least 3–4 inches of bark, mulch, wood chips or gravel are recommended to serve as a temporary ground covering (see Figure 11.18). If the covering is more than 3 inches thick, water will not reach plantings that may be in the area. Four inches is recommended for play areas. This level of material can be achieved by constructing a raised bed framed with 2" x 6" ACQ (alkaline copper quaternary) pressure-treated lumber. ACQ-treated lumber (or newer composite/non-wood materials) contains no EPA-listed hazardous compounds, whereas chemicals used in traditional pressure-treated lumber include compounds of, in addition to, copper, chromium and arsenic (commonly referred to as CCA-treated lumber), which may leach into the environment. Rock or other edging material may be used instead of lumber, depending on site specific conditions.

Do not use mulch made from recycled building components unless it has been tested and found to contain less than 400 µg/g of lead. EPA requires that replacement soil used in soil abatement contain less than 400 µg/g of lead. If possible, replacement bark, mulch, wood chips, and added soil should contain no more than 200 µg/g of lead, in order to provide a further safety factor.

Bark or other suitable soft material should be used as surface cover for contaminated soil near play equipment. This will offer a degree of protection from injuries that may result from falling. Consumer Product and Safety Commission regulations dealing with acceptable surface coverings in play areas may apply to public areas (CPSC, 1991). Artificial turf can also be used, but may cause drainage problems if it is not permeable.

Rubber cushioning specifically designed for playgrounds can also be used to cover contaminated, bare soil in play areas.

3. Raised Beds and Other Landscaping Options

The installation of raised beds can be an effective control measure in areas with high soil lead levels where grass would not be expected to grow well. They are often well suited for use in the drip zones of homes (i.e., the area extending approximately 3 ft. from the foundation). The beds can be created using 2" x 6" ACQ pressure-treated lumber, using landscape fabric to cover the ground followed by the application of top soil and mulch if the beds will be planted. If the beds are not planted, mulch, woodchips, or gravel can be placed directly over the landscape fabric.

A cost-effective approach to treat bare foot paths is to place stone or concrete stepping stones along the pathway and cover surrounding bare soils with a layer of gravel or mulch.
An option for play areas and picnic areas with contaminated bare soils is to create raised wooden platforms using ACQ pressure-treated lumber. This may be especially appropriate for small yards where relocation of such activities within the yard area is not possible.

4. Land Use Controls

Altering the use pattern of the yard is another common way to control human exposure to bare, contaminated soil. Measures include: fencing, to create a barrier to contaminated soil; planting thorny or dense bushes (see Figure 11.27) to discourage access; decks with lattice added below to restrict access to soil under the deck; relocating play areas to move a play area away from old painted structures, such as a fence or shed, and away from areas with high soil lead levels; warning signs; and educational efforts.

Preventing access to the bare, contaminated soil by fencing is most effective if other entrances and exits to the housing units can be maintained for use by residents, guests, commercial vehicles, and emergency vehicles (see Figure 11.28). Fencing may also be used to reduce exposure during a delay in the implementation of other interim control measures or soil abatement.

Educational efforts directed towards decreasing use of bare, lead-contaminated areas; avoiding eating or drinking in these areas; and frequent washing of hands may serve to reduce ingestion of the contaminated soil. The decision on whether to plant grass or erect barriers should be site-specific. Consideration should be given to the availability of alternative play areas, the location of contaminated soil with respect to entrances or exits, the likelihood that leaded dust may be tracked onto sidewalks or directly into the housing unit, the degree of supervision available, and local preferences.

FIGURE 11.27 Thorny Bushes as a Land Use Control

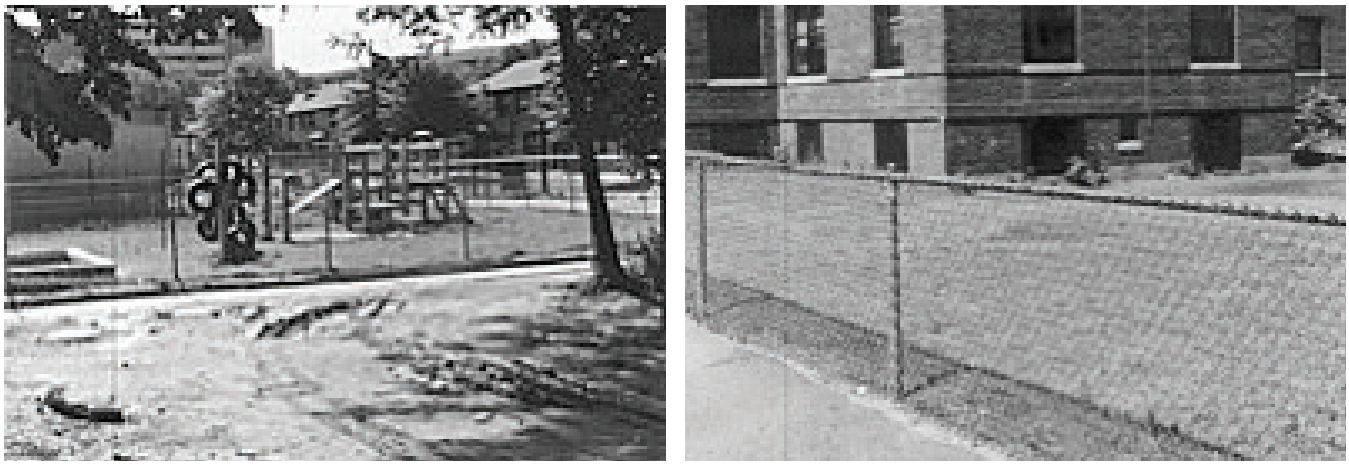

FIGURE 11.28 Using Fencing as an Interim Control. a) For Bare Soil. b) For other soil.

Table 11.6 Grasses and Their Appropriate Applications.

Grasses That Grow From Seeds	Texture	Climate	Durability
Bahia grass	Coarse	Warm	Excellent
Colonial Bent grass	Fine	Cool	—
Creeping Bent grass	Fine	Cool	—
Common Bermuda grass	Medium to Fine	Warm	Excellent
Kentucky Bluegrass	Fine	Cool	—
Rough Stalk Bluegrass	Fine	Cool	—
Centipede grass	Medium to Fine	Warm	—
Dichondra	Coarse	Warm	—
Chewings Fescue	Fine	Cool	Poor
Creeping Red Fescue	Fine	Cool	Poor
Hard Fescue	Fine	Cool	—
Tall Fescue	Coarse	Cool	Moderate to Excellent
Annual Ryegrass	Coarse	Cool	—
Perennial Ryegrass	Fine	Cool	Excellent
Grasses That Grow From Sod	**Texture**	**Climate**	**Durability**
Bahia grass	Coarse	Warm	Excellent
Hybrid Bermuda grass	Fine	Warm	Excellent
Kentucky Bluegrass	Fine	Cool	—
Centipede grass	Medium to Fine	Warm	Poor
Dichondra	Coarse	Warm	—
Tall Fescue	Coarse	Cool	—
Seashore Paspalum	Medium	Warm	—
Perennial Ryegrass	Fine	Cool	Excellent
St. Augustine grass	Coarse	Warm	—
Zoysia grass	Fine	Warm	Excellent

5. Reduction of Soil Tracking into Dwellings

Doormats can be used to minimize the entry of soil lead into the house. Doormats should be placed on the exterior and immediate interior of the entry doors. Mats should be cleaned by machine washing, or other wet methods, not by beating or sweeping. (See Section V of this chapter for further information.)

Removing shoes at the doorway also greatly minimizes the amount of leaded soil and dust tracked into the house.

6. Drainage and Dust Controls

Drainage controls may involve directing water flow away from the contaminated areas by alterations in adjacent grades and/or installation of drainage channels. Drainage channels that receive runoff from bare, contaminated soil areas may need to be fenced to reduce access. Dust generation can be reduced by periodic watering, the creation of windbreaks, or foot-traffic controls.

D. Making a Plan

It is recommended that a site plan of the yard be drawn to aid in planning soil lead hazard controls, and to serve as a documentation of the type and location of controls for future reference. The hazard control plan should be based on the nature and extent of hazards, yard use, topography, cost, future maintenance considerations, and property owner preference. In most situations, there is a range of acceptable treatments. Decisions are usually site specific. Working with a qualified landscaping professional to develop standards, details, and bid documents is recommended.

Often owners will be partial to certain types of soil lead hazard treatments (e.g. grass, gravel, mulch, fencing). Owners' preferences need to be balanced with lead levels, yard uses, and budget when selecting treatment methods. For example, an owner may want a lawn but grass treatments can be difficult to sustain in an urban yard due to excessive shade, compacted soil, or lack of watering by an owner. Property owner involvement in decision making will help motivate owners to maintain lead hazard control measures over time. Some important questions to ask during planning are:

- How highly contaminated is the soil?
- How is the yard used? Play, gardening, pets, picnicking, parking?
- Does the yard have primarily sunny or shady conditions?
- Are the plants selected appropriate to the yard conditions and region of the country?
- What is the budget for the project?
- Who will maintain the yard improvements after the work is completed?

E. Guidance on Specifications for Interim Controls of Soil Lead Hazards

Appendix 7.4 includes suggested language that may be helpful in drafting specifications for methods and products used in interim controls of soil lead hazards is provided below, and notes to specification developers.

Specification developers may adapt the specification language as needed to fit each particular site and each plan or design. Landscape contractors may be unfamiliar with the issue of lead in soil. Their standard practices may not be in line with lead-safe treatment methods. It is advisable to work closely with contractors on their first few lead-safe jobs to ensure that they are clear on how to properly implement interim controls. If abatement of soil lead hazards is planned, specifications should be written by a person certified in accordance with regulations of EPA or an EPA-authorized state, tribe or territory.

F. Monitoring and Maintaining Soil Interim Controls

If grass or sod is planted, or if bark, gravel, or other similar covering is used, it should be monitored visually. The monitoring should occur frequently immediately after installation and can be reduced thereafter. If ongoing monitoring shows that bare soil remains or reappears within 12 months of an interim soil control, the selected interim control is not effective. Soil abatement should be conducted (see Chapter 12), unless other interim controls can be shown to be effective for the specific site.