

Chapter 6: Ongoing Lead-Safe Maintenance

STEP-BY-STEP SUMMARY

ONGOING LEAD-SAFE MAINTENANCE: HOW TO DO IT	6-3
I. Introduction	6-7
II. Visual Assessment	6-9
A. Frequency and Scope	6-9
B. Information on Known Hazards and Existing Hazard Controls	6-10
C. Identifying Deteriorated Paint, Excessive Dust and Debris, and Failed Lead Hazard Controls	6-11
1. Training	6-11
2. Deteriorated Paint	6-11
3. Small Amounts of Paint	6-12
4. Visible Dust and Debris	6-13
5. Failed Lead Hazard Controls	6-13
6. Structural and Other Problems Causing Paint Deterioration and Hazard Control Failure	6-13
D. Identifying Chewable Surfaces	6-14
E. Identifying Bare Soil	6-14
F. Identifying Horizontal Surfaces that Are Not Smooth and Cleanable (Optional)	6-15
III. Ongoing Lead-Safe Maintenance Practices	6-16
A. Introduction	6-16
B. Ways in Which Maintenance Work Can Create or Intensify Lead Hazards	6-16
1. Paint Abrasion or Other Disturbance	6-16
2. Water Damage	6-17
3. Dust Exposures	6-17
4. Grounds Keeping	6-18
C. Elements of an Ongoing Lead-Safe Maintenance Program	6-18
1. Incorporate Lead-Safe Work Practices in All Paint-Disturbing Work	6-18
2. Stabilize Deteriorated Paint	6-21
3. Repair Failed Lead Hazard Controls	6-21
4. Clean-up Dust and Debris	6-21
5. Control Chewable Surfaces	6-22
6. Make Surfaces Smooth and Cleanable (Optional)	6-22
7. Inform Residents About Lead-Based Paint Hazards and Request Their Cooperation ...	6-22
8. Perform Clearance Examinations to Check Dust-Lead Levels	6-22
9. Addressing Bare Soil and Sandboxes.....	6-23
D. Qualifications of Firms, Workers, and Clearance Examiners	6-23
IV. Managing Ongoing Lead-Safe Maintenance	6-24
A. Determining the Scope of the Program	6-24

B. Assignment of Responsibilities 6-26

C. Description of Responsibilities 6-28

 1. Managing Visual Assessments 6-28

 2. Determining that Firms and Workers Are Qualified 6-28

 3. Maintaining Records 6-29

 4. Determining the Lead-Safe Work Practices To Be Used on Each Job 6-30

 5. Modifying the Work Order System 6-30

 6. Communicating with Residents 6-30

 7. Purchasing Supplies and Equipment 6-31

 8. Monitoring the Work and Arranging for Clearance Examinations 6-33

REFERENCES 6-42

FIGURES

Figure 6.1 Visual Assessment. 6-9

Figure 6.2 Opening screen from HUD’s first on-line visual assessment training curriculum. Updates may occur. 6-11

Figure 6.3 An area of bare soil beneath a window with deteriorated paint. 6-14

Figure 6.4 Bare soil in Figure 6.3 covered with mulch (the window was sealed during the process of controlling the bare soil). 6-23

Figure 6.5 Unit turnover is an excellent time to conduct the visual assessment and perform lead-safe maintenance activities. 6-27

Figure 6.6 Clean-up supplies. 6-32

FORMS

Form 6.0 Report of Visual Assessment (for Ongoing Lead-Safe Maintenance). 6-35

Form 6.1 Report of Visual Assessment of Bare Soil for Lead-Safe Maintenance 6-36

Form 6.2 Log of Visual Assessments for Ongoing Lead-Safe Maintenance 6-37

Form 6.3 Lead-Based Paint Inventory. 6-38

Form 6.3a Completed Lead-Based Paint Inventory for a Room/Space 6-39

Form 6.4 Lead Hazard Control Inventory 6-40

Form 6.5 Lead-Safe Maintenance Work Order 6-41

Chapter 6: Ongoing Lead-Safe Maintenance

Step-by-Step Summary

Ongoing Lead-Safe Maintenance: How to Do It

1. **Managing a lead-safe maintenance program.** Whether they do the work personally, have their staff perform the maintenance work (in either case, the rental owners must become certified renovation firms and have the work supervised by a certified renovator), or use outside maintenance contractors, owners should develop a written program defining the scope and procedures of lead-safe maintenance that apply to each pre-1978 property and should assign responsibilities for carrying out the elements of the program. Maintenance workers should be trained in lead-safe work practices and should be instructed on how to perform these functions in conjunction with normal duties. The project supervisors for these maintenance workers must be certified renovators, and the firm performing the work –whether owner’s firm or the outside maintenance contractor – must be a certified renovation firm when the work may disturb lead-based paint in amounts above the EPA’s minor repair and maintenance activities threshold. Work order forms should be changed (if necessary) to include items in the lead-based paint maintenance work order form in this chapter. If no work order is used, owners should develop a system to inform maintenance project supervisors and maintenance workers when a job may involve a lead hazard or lead-based paint. For multi-family housing, the lead-safe maintenance program should be included in the Lead Hazard Control Plan discussed in Chapter 11.
2. **Visual assessments.** Periodic visual assessments should be conducted to identify deteriorated paint, unusual amounts of visible dust, paint-related debris, and structural or other problems that may be causing some of those conditions. Visual assessments must be trained by individuals trained in performing them. Training in performing visual assessments is available on line on the HUD lead website, and in certain EPA lead safety courses, such as the risk assessment certification training. Also, the visual assessment should identify bare soil.

Visual assessments should be conducted at the following times:

- ◆ Whenever the owner receives a resident complaint regarding paint deterioration or other potential lead hazard in a dwelling unit or common area.
 - ◆ Whenever the dwelling turns over or becomes vacant.
 - ◆ Whenever significant damage occurs (i.e., flooding, vandalism, fire).
 - ◆ At least once every year.
3. **Maintain information on lead-based paint and lead hazard controls.** Before beginning work on a painted surface, determine whether it is known if lead-based paint is or is not present on the surface. If paint testing has *not* been conducted and the component was installed before 1978, presume lead-based paint is present, or have the paint tested.

If paint testing *has* been conducted on some or all surfaces on the property, it is recommended that owners and managers develop and keep up-to-date a ready-to-use list of surfaces that are known to

contain or not to contain lead-based paint, using an inventory form like that provided in this chapter (Form 6.3; this and all other forms in this chapter are at its end). Information on the presence or absence of lead-based paint should be based on testing by a certified lead-based paint inspector, risk assessor, or renovator, except that, as of the publication of this edition of these *Guidelines*, a spot test kit may not be used to determine the presence of lead-based paint. Also, if lead-based paint hazard controls have been conducted on the property, it is recommended that owners and managers maintain a similar list of lead-based paint hazard controls, if any have been conducted (Form 6.4).

4. **Determine resident protection and worksite preparation measures.** Before beginning a maintenance or renovation job that will disturb paint or soil, determine, based on the guidance provided in Chapter 8, what resident protection and worksite preparation measures should be implemented. If a written work order system is used, complete work order forms for each job, defining and documenting specific protective measures to be used (Form 6.5). Whether or not a written work order system is used, inform workers of the required protective measures.
5. **Educate residents before starting work.** The U.S. Environmental Protection Agency (EPA) requires that a person performing a paint-disturbing job for compensation, including staff of a housing development, must educate residents on lead-based paint hazards in the home and provide residents of each affected unit with a copy of the “*Lead-Safe Certified Guide to Renovate Right*” lead hazard information pamphlet or an EPA-approved State or Tribal alternative pamphlet. This education must occur within 60 days before beginning a maintenance or renovation job (<http://www.epa.gov/opptintr/lead/pubs/renovaterightbrochure.pdf>). This is required under the EPA’s “Pre-Renovation Education” Rule (40 CFR Part 745). It does not apply if the job is a “minor repair and maintenance activity” as defined by the EPA (or a State or Tribal authorized renovation certification program). Note that the EPA’s Pre-Renovation Education Rule is different from the EPA-HUD Lead-Based Paint Disclosure Rule, which requires that owners inform prospective tenants or buyers of any known lead-based paint and lead-based paint hazards on the property before the tenant is obligated under a lease or sales contract, and to provide the prospective tenants or buyers with a different lead hazard information pamphlet, *Protect Your Family From Lead In Your Home*, among other requirements (see Appendix 6).
6. **Conduct the work using lead-safe work practices.** Properly trained workers should correct problems found by visual assessments; these workers must be supervised by certified renovators working for certified renovation firms if the deteriorated paint being corrected is in amounts above the EPA’s minor repair and maintenance activities threshold. The workers should conduct all maintenance and renovation work in pre-1978 properties using lead-safe work practices, resident protection, and worksite preparation measures, in a manner consistent with Chapter 8 of these *Guidelines*. For a discussion of the applicable regulations, see Appendix 6.
7. **Do not use prohibited paint-removal practices.** Workers must not remove paint using the following methods in HUD-assisted housing; the last three are permitted in unassisted housing:
 - ◆ Open flame burning or torching.
 - ◆ Heat guns operating above 1100 degrees Fahrenheit or charring the paint.
 - ◆ Machine sanding or grinding without a HEPA local exhaust control.
 - ◆ Abrasive blasting or sandblasting without HEPA local exhaust control.

- ✦ Manual dry sanding or dry scraping, except dry scraping is acceptable in conjunction with heat guns operating at no more than 1100 degrees Fahrenheit or within one foot of electrical outlets or when treating defective paint spots totaling no more than 2 square feet in any one interior room or 20 square feet on exterior surfaces.
- ✦ Paint stripping in a poorly ventilated space when using a volatile stripper that is a hazardous substance in accordance with regulations of the Consumer Product Safety Commission (CPSC) at 16 CFR 1500.3(b)(4) (www.cpsc.gov/businfo/notices.html) or and/or a hazardous chemical in accordance with the OSHA regulations at 29 CFR 1910.1200 for 1926.59, as applicable to the work (www.osha.gov). Paint removers with methylene chloride should be avoided.

In addition, these *Guidelines* recommend strongly against the use of power washing or uncontained hydroblasting.

8. **Clean the work area and other work-related spaces.** After finishing the work, clean the following spaces in accordance with guidance provided in Chapters 8 and 14: work areas, spaces immediately adjoining the work areas, and passageways and storage spaces used by workers. Be sure to clean window troughs associated with the work area, as well as floors, interior window sills, and, for high-dust jobs, walls in the work area.
9. **Clearance examination.** Have a clearance examination performed in accordance with guidance in Chapter 15. Clearance is not required if the area of paint that was disturbed is no more than that specified in item 11, below, or if the work was conducted in unassisted housing under the EPA's Renovation, Repair, and Painting (RRP) Rule. Clearance examinations must be conducted by certified risk assessors, sampling technicians, or lead-based paint inspectors. Qualifications and requirements vary by State.
10. **Communicate with residents.** In rental housing, notify residents of the results of the clearance examination, if applicable, and of any other actual knowledge about lead-based paint and lead-based paint hazards obtained during the project. In HUD-assisted housing, this information must be communicated within 15 days after obtaining the clearance results. Urge residents to clean their units frequently to control dust accumulation. Ask residents to report occurrences of deteriorated paint, failed lead hazard controls (if applicable), and bare soil (if applicable), so that owners can promptly correct situations that are potential hazards.
11. **Consider the amount of paint disturbance.** HUD and EPA regulations do not require trained workers, lead-safe work practices or clearance/cleaning verification if the area of paint being disturbed is less than the applicable threshold area:
 - ✦ For HUD-assisted housing, HUD defines *de minimis* areas as: (a) 20 square feet (2 square meters) or less on exterior surfaces, (b) 2 square feet (0.2 square meters) or less in any one interior room or space, or (c) 10 percent or less of the total surface area on an interior or exterior component with a small surface area (such as window sills, baseboards, or other trim).
 - ✦ For unassisted housing, EPA defines minor repair and maintenance activities as those that disrupt 6 square feet or less of painted surface per room for interior activities or 20 square feet or less of painted surface for exterior activities where none of the work practices prohibited or restricted by 40 CFR 745.85(a)(3) are used (see unit II.C.3) and where the work does not involve window replacement or demolition of painted surface areas.

These *Guidelines*, however, strongly recommend that workers adhere to the following practices when disturbing any paint applied before 1978, even if lead-safe work practices are not required by regulation:

- (a) Never use HUD- or EPA-prohibited methods of paint removal, and
 - (b) If young children reside in the unit or frequent the common area, always keep residents out of the work area until after clean-up and workers have cleaned the work area and themselves thoroughly after finishing, and, when clearance or cleaning verification, when conducted, has been passed.
12. **Document all activities.** The results of visual assessments and any corrective measures taken should be documented, and such reports should be retained, especially in rental housing. Reports that document ongoing lead-safe maintenance may provide some degree of protection against charges of negligence if a child is found to have an elevated blood lead level.

I. Introduction

This chapter describes the procedure for maintaining housing in a lead-safe condition. Property owners and managers may use this procedure after completion of lead hazard controls, or, if applicable regulations permit, they may initiate a lead-safe maintenance program without completing any initial hazard controls. This chapter provides guidance to owners and managers of pre-1978 housing properties for guidance on how to maintain the housing in a lead-safe manner in accordance with the Environmental Protection Agency (EPA) Renovation, Repair, and Painting (RRP) Rule (40 CFR 745), and, for housing receiving HUD assistance, to properties covered by HUD's Lead Safe Housing Rule (24 CFR Part 35).

Owners and managers of properties that are covered by the HUD Lead-Safe Housing Rule should use this chapter as guidance on how to carry out the "ongoing lead-based paint maintenance" that is required by that regulation. The term "ongoing lead-safe maintenance," as used in this chapter, is intended to mean the same thing as the term "ongoing lead-based paint maintenance," as used in the HUD Lead-Safe Housing Rule. Pre-1978 properties that are required by the HUD Lead-Safe Housing Rule to incorporate ongoing lead-based paint maintenance into regular building operations include those receiving multi-family mortgage insurance, project-based assistance, rehabilitation assistance under the HOME program, tenant-based rental assistance (such as the Housing Choice Voucher Program), assistance under the Public Housing Program, and certain other types of assistance. This is not a complete list. Exemptions and exceptions may apply. Owners, managers or local program directors who are in doubt about HUD requirements should refer to the regulation at 24 CFR Part 35, contact their HUD field office, call the Lead Regulations Hotline at (202) 755-1785, extension 7698 (not a toll-free call), or e-mail HUD at: Lead.regulations@hud.gov. (Hearing- or speech-challenged individuals may access this number through TTY by calling the toll-free Federal Relay Service at 800-877-8339.)

Activities that are required by HUD or EPA are identified in this chapter as being "required" or as actions that "must" be done. Activities that are not required by HUD but are recommended by these *Guidelines* are identified as being "recommended" or as actions that "should" be done. Activities that may be done at the discretion of the owner or manager are identified as "optional."

Lead-safe maintenance is necessary because the potential exists for lead-based paint hazards to develop wherever lead-based paint is present. Previously intact lead-based paint can become deteriorated, lead hazard controls can fail, and maintenance or renovation can disturb leaded paint and generate lead in dust. The purposes of ongoing lead-safe maintenance are: (1) to assure that if potential lead hazards occur or reoccur, they will be spotted and controlled promptly before young children become exposed to lead; and (2) to assure that maintenance and renovation work that disturbs leaded paint will not cause lead exposure during the work and will not leave dwellings or the nearby environment contaminated with leaded-dust when the work is finished. If ongoing lead-safe maintenance is done with care, the probability of childhood lead exposure from lead-based paint hazards on the property is significantly reduced. Also, it is unlikely that a subsequent professional reevaluation, if required, will find any deteriorated paint or failed hazard control treatments, thereby substantially reducing the cost to the owner. (Reevaluation is described in section VII of Chapter 5.)

Ongoing lead-safe maintenance consists of:

- ◆ **Periodic visual assessments** to identify deteriorated paint, unusual amounts of visible dust, paint-related debris, failed lead hazard controls (if applicable), bare soil (if soil-lead hazard control is required or recommended), horizontal surfaces that are not easily cleanable (optional), chewable

surfaces with evidence of teeth marks (optional), and problems (structural and otherwise) that may be causing some of the foregoing conditions.

- ✦ **Correction of problems found in the visual assessments**, using lead-safe work practices for jobs that exceed a *de minimis* area (a minimal amount of paint disturbance, which is explained more fully in section II.C.3, below).
- ✦ **Using lead-safe work practices** when making all other paint-disturbing repairs and renovations exceeding the *de minimis* level.
- ✦ **Conducting a clearance examination** after any paint-disturbing work that exceeds the *de minimis* level.
- ✦ **In rental housing, asking residents to report to management** occurrences of deteriorated paint, chewing by young children on painted surfaces, failed lead hazard controls (if applicable), and bare soil (if applicable), so that owners can promptly correct situations that may be lead-based paint hazards.

Owners, managers, or maintenance staff can perform visual assessments and lead-safe work practices with only modest training. Lead-safe work practices are modifications to traditional maintenance and renovation methods. They are described in general terms in this chapter and in detail in other chapters of these *Guidelines*. Clearance examinations, however, must be done by a certified professional.

Ongoing lead-safe maintenance should be conducted in all dwelling units and common areas, unless the property is exempt, and the scope should include all exterior and interior surfaces where lead-based paint is known or presumed to be present. Also, lead-safe maintenance of ground cover is recommended if Government regulations affecting the property require that soil-lead hazards be identified and controlled, or if the owner or manager has information from a reliable source that soil-lead hazards have been found on the property. Otherwise, lead-safe maintenance of ground cover is optional in ongoing lead-safe maintenance.

These *Guidelines* recommend that lead-safe maintenance be practiced in all pre-1978 residential properties in which lead-based paint is known to be present or may be present. While lead-safe maintenance practices were designed initially for rental housing, the rationale and the basic procedure apply just as well to owner-occupied housing.

HUD regulations do not require ongoing lead-safe maintenance in residential properties found by a certified lead-based inspector to contain no lead-based paint, as defined by applicable Federal, State, Tribal or local regulations. Similarly, EPA regulations do not require lead-safe work practices in residential properties or child-occupied facilities found by such a lead-based inspection to be free of lead-based paint. The Federal standard for applied lead-based paint is paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter or 0.5 percent by weight (the latter equivalent to 5,000 parts per million by weight). HUD and EPA regulations do not require lead-safe work practices if amounts of paint to be disturbed are below specific threshold amounts (see section II.C.3, below) or if the specific paint being disturbed is known not to be lead-based paint.

However, many pre-1978 painted surfaces that are classified as not being lead-based paint under Government standards may still contain *some* lead that can cause environmental contamination and human exposure if not handled correctly. Therefore, these *Guidelines* recommend the following work practices when disturbing any paint installed before 1978, regardless of whether it is or is not lead-based paint and regardless of whether the amount of paint to be disturbed is less than the applicable *de minimis* area:

- (1) *Never use the prohibited methods of paint removal that are described in this and other chapters of these Guidelines; and*
- (2) *When disturbing paint in housing occupied by children of less than 6 years of age, clean the work area thoroughly after finishing, preferably with a vacuum and wet cleaning, and keep residents out of the work area until after the clean-up.*

The rest of this chapter consists of three sections. Section II describes visual assessments in detail. Section III describes the lead-safe maintenance practices to be used in performing repairs, maintenance, or renovation. Section IV provides information on how to develop and manage an ongoing lead-safe maintenance program.

This chapter does not provide guidance on reevaluation. That subject is discussed in section VII of Chapter 5.

II. Visual Assessment

This section describes the scope, frequency, and methods to be used in visual assessments for lead-safe maintenance. Please note that this visual assessment is somewhat different than the visual assessments that are components of a risk assessment (described in Chapter 5) and a clearance examination (described in Chapter 15).

A. Frequency and Scope

The owner or owner's representative should perform, at least once a year, a visual assessment of each dwelling unit, each common area that is used by residents, exterior painted surfaces, and ground cover (if control of soil-lead hazards is required or recommended) (see Figure 6.1). Visual assessments should also be conducted when the owner or management receives complaints from residents about deteriorated paint or other potential lead hazards, when a dwelling turns over or becomes vacant, or when significant damage occurs that could affect the integrity of hazard control treatments (e.g., flooding, vandalism, fire).



FIGURE 6.1 Visual Assessment.

People performing a visual assessment should determine whether any of the following are present:

- ◆ **Deteriorated paint on surfaces** (both interior and exterior) that are known or presumed to be coated with lead-based paint; and the estimated size of area;
- ◆ **Visible settled dust** that clearly exceeds normal housekeeping standards;
- ◆ **Paint-related debris** (for example, paint chips or residue from paint stripping);
- ◆ **Failed lead-based paint hazard controls**, if any have been installed, particularly encapsulations and enclosures of paint surfaces, treatments of window friction surfaces, coverings of painted floors or stair treads, or coverings of bare soil;

- ◆ **Structural and other problems that may be causing paint deterioration or the failure of lead-based paint hazard controls**, such as water leaks and windows and doors with friction or impact surfaces; or
- ◆ **Bare soil** in outdoor play areas and other yard areas known to contain or presumed to contain lead in soil exceeding applicable standards, if soil-lead hazard control is required or recommended.

In addition, identification of the following items is optional:

- ◆ Horizontal surfaces that are not easily cleanable, and
- ◆ Chewable surfaces with evidence of teeth marks.

The findings of a visual assessment, including the exact location of any occurrences of the conditions listed above, should be recorded on Form 6.0 or a similar form. Corrective maintenance should be performed if any of these conditions are present.

B. Information on Known Hazards and Existing Hazard Controls

If testing of paint or soil and/or control or treatment of paint-lead or soil-lead hazards has been conducted in the areas to be visually assessed, the person performing the visual assessment should have the following information:

- ◆ The location of paint that is known to be lead-based paint and the location of paint that is known not to be lead-based paint. All other paint in pre-1978 housing should be presumed to be lead-based paint. According to Federal standards, lead-based paint is applied paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter (mg/cm²) or more than 0.5 percent by weight or 5,000 parts per million (ppm). Standards issued by an EPA-authorized State, Tribal or local program may be different, and should be used if more stringent (i.e., lower). Information about the presence or absence of lead-based paint should be recorded on Form 6.0 or a similar form.
- ◆ The type and location of each control or treatment of a paint-lead hazard this is readily accessible to the visual assessor, except that (1) information on abatements that removed all lead-based paint is not necessary, and (2) information on paint stabilization is optional because failure of paint stabilization will be visually evident.
- ◆ The location of soil that is known to contain and not to contain soil-lead hazards and the type and location of each control or treatment of a soil-lead hazard, if control of soil-lead hazards is required or recommended. According to Federal standards, a soil-lead hazard is bare soil that contains total lead equal to or exceeding 400 ppm in a play area or an average of 1,200 ppm of bare soil in other parts of the yard. Standards issued by an EPA-authorized State, Tribal or local program may be different, and should be used if more stringent (i.e., lower).

Section IV.C.3, below, provides guidance on keeping inventories of known lead-based paint and controls and treatments that are in place.

C. Identifying Deteriorated Paint, Excessive Dust and Debris, and Failed Lead Hazard Controls

1. Training

It is not necessary to be a certified lead-based paint inspector, risk assessor or renovator to perform visual assessments for ongoing lead-safe maintenance, but people performing visual assessments must be trained to do so. While the inspector, risk assessor and renovator certification training courses include visual assessment training, for people who do not need to become certified in those disciplines, HUD recommends they take its module on visual assessment for deteriorated

paint available on the Internet at <http://www.hud.gov/offices/lead/training/> (see Figure 6.2). This course usually takes approximately one hour to complete. It is available as a self-paced, web-based training module. This module also includes the option to print a notice of course completion, which should be kept in the visual assessor's file.



FIGURE 6.2 Opening screen from HUD's first on-line visual assessment training curriculum. Updates may occur.

It is also recommended that owners and managers give those performing visual assessments a brief orientation or the information on: (1) the types of structural and other problems to look for that may be causing paint deterioration; (2) the types of lead-based paint hazard controls that have been used on the property, if any, and the signs of failure that should be identified; (3) what to look for with regard to bare soil, if control of soil-lead hazards is required or recommended; and (4) any optional considerations that the owner wants to identify in the assessment, such as surfaces that are not smooth and cleanable, and chewable surfaces with evidence of teeth marks.

2. Deteriorated Paint

Ongoing maintenance of painted surfaces is desirable for several reasons: (1) it helps prevent childhood lead poisoning; (2) it is cost-effective; and (3) it improves the condition and appearance of the property. Deterioration of lead-based paint is hazardous to young children because it may make it easier for a child to put contaminated paint in his or her mouth and because it may contribute to lead in house dust to which the child is exposed. Preventive maintenance can considerably extend the life of paint coatings, especially on the exterior.

Chapter 5 contains detailed information on how to visually identify deteriorated paint (see text at section II.D.3 of Chapter 5). All interior and exterior paint that is peeling, cracking, alligating, blistering, damaged, or separated from the substrate should be reported. Nail holes and hairline cracks are not considered to be deterioration.

If deteriorated paint is present, the person performing the visual assessment should describe its location on Form 6.0 or similar form, by room, building component, and specific location on the component. If it is known, as a result of previous paint testing, whether the paint is or is not lead-based paint, that information should also be entered on Form 6.0. It is recommended that there also be recorded on the form an estimate of the approximate area (in square feet) of each

occurrence of deteriorated paint. These area estimates will assist in planning maintenance work and will indicate whether the area of paint that will be disturbed is large enough that full lead-safe work practices must be used and a clearance examination must be conducted, as required in properties subject to the HUD Lead-Safe Housing Rule (see the following section on *de minimis* paint disturbance below). Finally, it is recommended that the visual assessor record any observed structural or other problems that may be causing paint deterioration (see section II.C.6, below).

Note that Forms 5.2 and 6.0 both cover visual assessments, the former for risk assessments, and the latter for visual assessments; intentionally, they are identical, which is why the forms have double titles.

3. Small Amounts of Paint

As described above, the area estimates in the visual assessments will determine how the repair or work is to be performed.

- ✦ HUD's Lead Safe Housing Rule states (24 CFR 35.1350(d)) that lead-safe work practices and clearance are not required in HUD-assisted "target housing"¹ if the total amount of paint disturbed by the work is no more than:
 - (1) 20 square feet on exterior surfaces,
 - (2) 2 square feet in any one interior room or space, or
 - (3) 10 percent of the total surface area on an interior or exterior component with a small surface area (such as window sills, baseboards, and trim).
- ✦ EPA's Renovation, Repair, and Painting (RRP) Rule does not cover minor repair and maintenance activities (40 CFR 745.83) in target housing or pre-1978 child-occupied facilities that disrupt no more than:
 - (1) 6 square feet or less of painted surface per room for interior activities, or
 - (2) 20 square feet or less of painted surface for exterior activities, and where none of the work practices prohibited or restricted by that rule (open-flame burning or torching of lead-based paint, using machines that remove lead-based paint through high-speed operation without HEPA exhaust control; and operating a heat gun on lead-based paint at or above 1100 degrees Fahrenheit) are used and where the work does not involve window replacement or demolition of painted surface areas.

These *Guidelines* recommend, however, that the following practices *always* be observed when disturbing paint in pre-1978 housing or child-occupied facilities, unless it is known that all layers of paint to be disturbed have been applied after 1977:

- (1) Never use the prohibited methods of paint removal that are described in section III.C.1, below; and
- (2) When disturbing paint *in housing occupied by children of less than 6 years of age, and child-occupied facilities*, always clean the work area thoroughly after finishing, preferably with a vacuum and wet cleaning, and keep occupants out of the work area

¹ Target housing is defined by Title X as meaning any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless any child who is less than 6 years of age resides or is expected to reside in such housing) or any 0-bedroom dwelling. Most pre-1978 housing is target housing.

while work is underway and until after the clean-up and passing of clearance or cleaning verification, as applicable.

4. Visible Dust and Debris

The visual assessor should record on Form 6.0 or similar form, the location of any visible dust that exceeds normal housekeeping standards and any paint-related debris observed in dwelling units and common areas. If a dwelling unit is occupied, the residents should be notified that such dust or debris may be a hazard, and they should be urged to keep the dwelling clean. Form 6.0 provides a place to check whether residents are so notified. Of course, the owner should clean-up dust and debris in unoccupied dwelling units and common areas.

5. Failed Lead Hazard Controls

If any lead-based paint hazard controls are in place in the area being observed, the person performing the visual assessment should examine each such control, determine whether it is or is not still intact, and record the observation on Form 6.0 or similar form, including a brief written description of the problem. Although paint stabilization is a valid method of interim control of deteriorated lead-based paint, it is not necessary to make a special effort to examine all previous paint stabilizations, because the failure of paint stabilization will be caught by the identification of deteriorated paint.

6. Structural and Other Problems Causing Paint Deterioration and Hazard Control Failure

Chapter 11, section III.A, describes some of the problems that could cause premature paint failure or failure of lead-based paint hazard controls. People performing visual assessments should be familiar with this material and should briefly describe any such observed conditions on Form 6.0 or similar form. The most common cause of paint deterioration is moisture, which may derive from leaks in the roof, windows, walls, doors, or plumbing. The moisture may cause decay, rusting, or other deterioration of the building component that is painted, or it may affect just the paint. Other causes, in addition to moisture, include ultraviolet rays, extreme heat and cold, wind, and mechanical damage.

The visual assessor should also indicate on the form whether deteriorated paint results from friction or impact, because these conditions affect the method used to make a durable repair. A friction surface is a surface that is subject to abrasion or friction, such as certain window, floor, and stair surfaces (24 CFR 35.110, 40 CFR 745.63) may generate lead-contaminated dust if the paint is lead-based paint. The most common painted friction surfaces are on the channels in which the sashes of double-hung windows slide. Another common location is the edge or the head, jamb, or sill of doors that are poorly hung.

An impact surface is a surface that is subject to damage by repeated sudden force, such as certain parts of door frames (24 CFR 35.110, 40 CFR 745.63). Generally, the owner is responsible only for impact damage generated by a malfunctioning building component, such as a door knob banging against a wall. However, impact damage caused by residents should be taken into account when determining how to stabilize deteriorated paint on such surfaces.

D. Identifying Chewable Surfaces

Young children sometimes eat or mouth non-food articles. A chewable surface, such as a protruding interior window sill that is painted with lead-based paint, can be a dangerous hazard to them. Owners should ask visual assessors to look for potential chewable-surface hazards if a young child lives in the dwelling unit. To be a hazard, according to EPA regulations, a chewable surface must have evidence of teeth marks, but some States do not require bite marks for a surface to be considered a chewable-surface hazard.

These *Guidelines* recommend visual assessment of chewable surfaces only if a child under age 6 resides in the unit or the owner knows that a child under 6 is expected to reside there in the near future, and in pre-1978 child-occupied facilities. If a parent, guardian, or care giver is present at the time of the visual assessment, the assessor may ask whether a child has been observed chewing on painted surfaces, and, if so, which surfaces. Any identified surfaces should then be examined for evidence of teeth marks. If no parent or guardian is present, the visual assessor should examine interior window sills for teeth marks. Hard metal substrates and other materials that cannot be dented by the bite of a young child are not considered chewable.

E. Identifying Bare Soil

The visual assessment should also include an inspection of play areas and other yard areas to identify bare soil (see Figure 6.3) if one or more of the following conditions exists:

- ◆ Government regulations (Federal, State, Tribal or local) affecting the subject property require that bare soil be tested for lead and/or that known or presumed soil-lead hazards be controlled;
- ◆ The owner has actual knowledge, based on laboratory analysis of soil samples, that soil-lead hazards (as defined by Federal, State or Tribal regulations) have been found on the property and have not been abated; or
- ◆ The owner has actual knowledge, based on laboratory analysis of soil samples, that soil-lead hazards (as defined by Federal, State or Tribal regulations) have been found *consistently* on three or more other similar properties in the immediate neighborhood of the subject property (e.g., same block or block across the street), even though the owner does not have testing data showing that soil on the subject property does not contain soil-lead hazards.

Even if these conditions do not apply, an owner may wish, at his or her option, to take special precautions regarding ground cover if it is generally known that some soil in the neighborhood may be contaminated with lead and if young children reside in the property.

Bare soil means soil or sand not covered by grass, sod, other live ground covers, wood chips, gravel, artificial turf, or similar covering. (24 CFR 35.110) (see Figure 6.3)



FIGURE 6.3 An area of bare soil beneath a window with deteriorated paint.

A visual assessment for bare soil should include identification and reporting (on Form 6.1 or similar form) of any failures of earlier interim controls or abatements of soil-lead hazards as well as new areas of bare soil that have not been subject to hazard control. Information on failed hazard controls may be useful in selecting methods that will have a longer effective life.

The visual assessment for bare soil should distinguish between play areas and non-play areas. A play area is defined as an area of frequent soil contact by children of less than 6 years of age as indicated by, but not limited to, such factors as the presence of play equipment (e.g., sandboxes, swing sets, and sliding boards), toys, other children's possessions, observations of play patterns, or information provided by parents, residents, care givers, or property owners (24 CFR 35.110, 40 CFR 745.63). All play areas should be free of bare soil, unless it has been determined by a qualified professional (i.e., a certified risk assessor in most jurisdictions) that lead levels in the soil do not exceed applicable standards.

In non-play areas, however, bare soil totaling no more than 9 square feet (or 0.8 square meters) per property may be considered *de minimis*; that is, less than 9 square feet of bare soil with levels of lead exceeding applicable standards is not likely to constitute a hazard. The EPA and some States do not recognize this bare-soil *de minimis* level. "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." (EPA, 2001)

Therefore persons conducting visual assessments for bare soil should make a rough calculation of the approximate area of bare soil in non-play areas and record that figure for use in determining whether additional soil coverings are necessary.

Visual assessors should always examine the bare soil within three feet of building walls (dripline). Research has found that soil in this area tends to have a higher concentration of lead than in other parts of the yard (NCHH, 2004).

F. Identifying Horizontal Surfaces that Are Not Smooth and Cleanable (Optional)

In homes with dust-lead hazards, it is often difficult to adequately clean rough or pitted surfaces that are accessible to children so that they are free of dust hazards and so the surfaces will achieve clearance after cleaning by licensed contractors or workers trained in the use of lead-safe work practices. Contaminated dust lodges in cracks and crevices in floors, interior window sills, or window troughs, and then is picked up in wipe samples that are analyzed by laboratories.

Therefore owners may want to prevent this problem by asking people performing visual assessments to identify surfaces that are likely to be difficult to clean, so that they can be repaired or coated with a sealant. Alternatively, owners can wait and see if there is a clearance failure and, if so, then repair the surface so that it is smooth and cleanable.

III. Ongoing Lead-Safe Maintenance Practices

This section describes methods of performing maintenance jobs in a lead-safe manner.

A. Introduction

With traditional building maintenance practices, disturbance of surfaces with lead-based paint can turn a potential problem into an immediate hazard. However, if maintenance practices are modified to provide sufficient lead-based paint protection to residents, workers, and the environment, lead hazards associated with maintenance and renovation work can be controlled.

To illustrate the importance of protective measures, even for small-scale jobs, consider how much lead is contained within a 1 square foot area that is painted with lead-based paint at the Federal regulatory definition of 1 mg/cm². To do this, convert centimeters (cm) to inches, and then inches to feet (ft), and then milligrams (mg) to micrograms (µg):

$$1 \text{ mg/cm}^2 * (2.54 \text{ cm/inch})^2 * (12 \text{ inches/ft})^2 * 1,000 \text{ µg/mg} = 929,000 \text{ µg/ft}^2$$

The 1 ft² painted area with lead-based paint at the Federal regulatory definition of 1 mg/cm², will have 929,000 µg of lead (almost a gram of lead). In the extreme case of all of this lead being turned into dust (as might happen with machine sanding) and none of the dust being collected by a filter, but being distributed evenly over the floor in a room measuring 10 feet x 10 feet (100 square feet, or 100 ft²), then there would be:

$$929,000 \text{ µg/ft}^2 / 100 \text{ ft}^2 = 9,290 \text{ µg/ft}^2$$

of lead on the floor. This number is compared to the EPA floor-dust lead hazard standard and floor clearance standard of 40 µg/ft². (Another way of looking at this is that the lead from just a ½ inch circle of paint that meets the lead-based paint definition would, if spread evenly over the 10 foot x 10 foot room would create lead dust at the dust-lead hazard threshold throughout the room.) Therefore, a significant amount of leaded dust can be released from even a small painted area. Even though most maintenance jobs would not turn *all* the lead-based paint into leaded-dust, it should be clear that large amounts of lead-contaminated dust can be generated from even low concentrations of lead-based paint or conversion of even small fractions of the paint into dust.

Lead-safe work practices and thorough clean-up are essential even for small-scale jobs. That is why these *Guidelines* recommend them even for jobs for which HUD and EPA regulations do not require them. Workers should never use the prohibited paint-removal practices described in Section III.C.1, below. In addition, when working in dwelling units or common areas frequented by children under age 6, workers should keep residents and pets out of the work area and should thoroughly clean the work area before letting them enter.

B. Ways in Which Maintenance Work Can Create or Intensify Lead Hazards

1. Paint Abrasion or Other Disturbance

The most common problem with traditional maintenance practices is that lead dust may be created when paint is disturbed. Common activities, such as sanding, scraping, sawing, hammering, or grinding on surfaces coated with lead-based paint can create large amounts of lead-contaminated dust, which may be hazardous for both workers and residents, especially

young children. Torch cutting or welding on painted metal surfaces is especially dangerous to workers and is prohibited under OSHA regulations (the paint must be removed before torch cutting or welding). Although most individual maintenance jobs do not last very long, it is possible to cause a significant exposure for the worker and create hazards for occupants. For example, power sanding on surfaces with lead-based paint has been found to cause worker exposures as high as 11,000 $\mu\text{g}/\text{m}^3$ (Lange, 2000), which is well above the OSHA permissible exposure limit (PEL) of 50 $\mu\text{g}/\text{m}^3$. Worker exposures associated with manual sanding, along with manual scraping, without control measures may also exceed the OSHA PEL, and may exceed 500 $\mu\text{g}/\text{m}^3$ (Zhu, 2012), OSHA's assumed highest concentration generated by manual sanding (29 CFR 1926.62(d)(2)(i)(A)) and the maximum concentration for which half-faced HEPA-filtered air purifying respirator may be used. Other typical tasks, such as carpet removal, have also been shown to result in worker exposures well above the OSHA PEL, depending on how long the exposures last (NIOSH, 1990; EPA, 1997b; EPA, 1999a). Exposures can be kept well below the limit if the work is carefully conducted (NIOSH, 1990).

2. Water Damage

Water damage can occur from sudden circumstances, such as bursting pipes, overflowing tubs and sinks, broken fixtures, or storm damage. Water damage can also occur from less obvious problems, such as condensation, slow leaks in pipes or fixtures, roof failure, improper building drainage around the perimeter of the building, or accidental resident misuse (e.g., leaving the windows open during a rain storm). All of these situations can lead to paint failure, either by deterioration of the paint itself, or deterioration of the painted substrate. If only the source of the water leak is repaired, as in an emergency situation, the paint deterioration may not be evident until several weeks following the water leak repair and it may be left to the resident to repaint. If lead-based paint is known or presumed to be present, however, the paint should also be repaired as quickly as possible, after the surface has dried and the substrate has been repaired, using lead-safe work practices as stated in Section C.1.

3. Dust Exposures

Many types of maintenance work can release substantial quantities of dust into the residence. Examples include preparing surfaces for repainting, floor sanding, window repair (window troughs often contain very high levels of leaded dust), and plastering. Traditional maintenance practices employ the use of drop cloths and cardboard or newspapers to protect furniture, eating surfaces, and walkways. If the drop cloths become full of leaded dust and are used again, they may contaminate the next worksite. Poorly-controlled dust during maintenance work has accounted for numerous cases of childhood lead-poisoning (Farfel and Chisolm, 1990; Amitai, 1991; Rabinowitz, 1985a; Shannon, 1992; EPA, 1999b).

Lead-contaminated dust exposures to workers and residents can be controlled by the following:

- ◆ **Using wet methods** when sanding, scraping, or sweeping.
- ◆ **Covering floors and furnishings** with disposable and impermeable protective sheeting such as polyethylene.

- ✦ **Using foot coverings**, dedicated footwear and walk-off mats to minimize tracking leaded-dust out of the work area.
- ✦ **Sealing rooms** to avoid contamination of adjacent areas.
- ✦ **Using approved respirators**.

4. Grounds Keeping

If the soil is contaminated, certain grounds keeping activities can pose a risk to workers and occupants. Excavation to lay new pipes, regrading, and sodding disturbs the soil. Bare soil can be more easily tracked or blown into dwellings where it becomes part of the house dust and where a child can become exposed to it. If the soil is known or presumed to contain high concentrations of lead, simple protective measures can be introduced to control the spread of dust from ground keeping activities. Keeping the soil wet is usually effective, if proper erosion control measures are established. Disposable shoe coverings or dedicated work shoes will, if used properly, prevent tracking contaminated soil into dwellings, workers' automobiles, and maintenance shops.

C. Elements of an Ongoing Lead-Safe Maintenance Program

The basic elements of ongoing lead-safe maintenance are as follows:

1. Incorporate Lead-Safe Work Practices in All Paint-Disturbing Work

"Lead-safe work practices" are ways to perform paint-disturbing work (repairs, maintenance, rehabilitation, renovation, or remodeling) so that occupants and workers are protected from exposure to lead in dust and debris generated by the work and so that the environment is not contaminated. Owners should incorporate lead-safe work practices into all maintenance, renovation, or repair work that disturbs paint, and require that they be conducted by appropriately trained and, as applicable, certified workers. Lead-safe work practices include the following:

- ✦ **Work with adequate amounts of water.** Keep the surface wet with a water mist, except near electrical outlets and fixtures, so sanding, scraping, planing, etc. generate less dust and the dust that is created is controlled.
- ✦ **Protect occupants and prepare the worksite.** The worksite should be delineated and set up before work begins. Occupants should be protected. Guidance on worksite set-up and occupant protection is provided in Chapter 8. This guidance varies with the amount of dust likely to be generated by the work.
 - Generally, occupants should not be allowed in the work area until after the work is finished and the area is cleaned and cleared. Temporary relocation may be necessary. Personal belongings should be moved from the area when possible, or cleaned, covered and sealed. Floors of the work area (and, for high-dust jobs, passageways used by workers) should be protected with disposable, impermeable protective sheeting (such as heavy-duty polyethylene). Workers should not track dust from the work area to the rest of the dwelling.

- For high-dust jobs, dust should be contained within the room or rooms in which work is conducted by installing protective sheeting over doors and temporarily turning off the HVAC system for the work area and covering HVAC vents.
- ◆ **Specialized cleaning.** For jobs lasting more than a day, daily clean-up is recommended. When the work is completed, the worksite should be thoroughly cleaned, preferably with a HEPA vacuum and wet wash, to assure that the site is free of dust-lead hazards and can achieve clearance. Guidance on cleaning is provided in Chapter 14. Generally, final clean-up includes cleaning and removal of protective sheeting, and vacuuming and wet washing all horizontal surfaces in the work area, adjoining spaces and passageways used by workers, including floors, interior window sills, and window troughs. The area to be cleaned depends on the amount of dust generated by the job.
- ◆ **Do not use the following paint removal practices except as specified.** Workers should *not* use the following paint removal methods in HUD-assisted housing; the methods numbered 6 and 7 are permitted in unassisted housing:
 1. **Open-flame burning or torching.** This can produce toxic gases that a HEPA filter cartridge on a respirator cannot trap (a second, organic, filter is necessary). This method can create high levels of toxic dust that are extremely difficult to clean up; and it can burn down a house.
 2. **Operating a heat gun at surface temperatures at or above 1100 degrees Fahrenheit.** Operating heat guns at such high temperatures can release lead dust and fumes and induce large increases in the blood lead levels of young children (Farfel and Chisolm, 1990; also cited by EPA in the preamble to its final rule on Requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities. 61 FR 45777, August 29, 1996, at 45795.)
 3. **Machine sanding or grinding without a HEPA local exhaust control and a shroud.** Machine sanding or grinding with both a HEPA local exhaust control attached to the tool, and a shroud that meets the following performance requirement is permissible. The shroud must surround the surface being contacted by the tool with a barrier that prevents dust from flying out around the perimeter of the machine, *and* attached to a HEPA vacuum. However, this work method should be conducted used only by workers trained in its use. Because some dust may still blow out around the perimeter of the machine, workers near the machine should wear half-face respirators (with N100 cartridge) at a minimum. Also, the work area should be completely isolated if the machine is used inside.
 4. **Abrasive blasting or sandblasting without HEPA local exhaust control.** These methods should be used only within an enclosure that contains the spread of dust, chips, and debris, and that has a HEPA exhaust. This work method should be conducted used only by workers trained in its use.
 5. **Uncontained hydroblasting.** Removal of paint using this method can spread paint chips, dust, and debris beyond the work area containment. Contained pressure washing at less than 5,000 pounds per square inch (PSI) can be done within a protective enclosure to prevent the spread of paint chips, dust, and debris. Water run-off should also be contained. Because this method requires precautions that

are beyond the scope of most courses in lead-safe work practices, it should only be used by certified lead abatement workers under the supervision of a certified abatement supervisor.

6. **Manual dry sanding or dry scraping**, except that dry scraping is acceptable in conjunction with heat guns with surface temperature of less than 1100°F, or within one foot of electrical outlets, or when treating defective paint spots totaling no more than 2 square feet in any one interior room or 20 square feet on exterior surfaces.
7. **Paint stripping in a poorly ventilated space when using a volatile stripper that is a hazardous substance** in accordance with regulations of the Consumer Product Safety Commission (CPSC) at 16 CFR 1500.3(b)(4) and/or a hazardous chemical in accordance with the OSHA regulations at 29 CFR 1910.1059 (Methylene Chloride), as applicable to the work. (This practice is prohibited by HUD (24 CFR 35.140(f)) regarding work on HUD-assisted housing, but is not explicitly prohibited by EPA regulations.) OSHA's Respiratory Protection regulation (29 CFR 1910.134) may also apply when working in a space without adequate ventilation, as could the other OSHA personal protective equipment standards.

Paint strippers with methylene chloride should be avoided. OSHA has found that adults exposed to methylene chloride "are at increased risk of developing cancer, adverse effects on the heart, central nervous system and liver, and skin or eye irritation. Exposure may occur through inhalation, by absorption through the skin, or through contact with the skin." ("Occupational Exposure to Methylene Chloride; Final Rule," 62 *FR* 1493, January 10, 1997). It is especially important that people who use paint strippers frequently not use them in a poorly ventilated area. CPSC and EPA recommend that people who strip paint provide ventilation by opening all doors and windows and making sure there is fresh air movement throughout the room ("What You Should Know About Using Paint Strippers," CPSC Document #423, and EPA Document EPA 747-F-95-002) (www.cpsc.gov/cpsc/pub/pubs/423.html). OSHA's permissible exposure limit for methylene chloride in air was reduced in 1997 from 500 to 25 parts per million (29 CFR 1910.1052 for general industry, and the identical 29 CFR 1926.1152 for construction). Methylene chloride cannot be detected by odor at the permissible exposure limit, and negative-pressure respirators with organic vapor cartridges are generally ineffective for personal protection against it. OSHA's regulation for Methylene Chloride, 29 CFR 1910.1052(g) covers respiratory protection.

- ✦ Alternative paint strippers may be safer but have their own safety and/or health concerns, so all paint strippers must be used carefully. Always follow precautions provided by the manufacturer. Waste and debris from the job should be wrapped or bagged, and sealed and properly disposed of as described in Chapter 10.

Lead-safe work practices are not required by EPA and HUD regulations if: (1) the paint being disturbed is not lead-based paint according to the Federal regulations; and (2) the total amount of paint disturbed by the work is no more than the applicable very small amount (the *de minimis* amounts, or the minor repair and maintenance activities amounts, described in section II.C.3, for work covered by the HUD Lead Safe Housing Rule or the EPA RRP Rule, respectively). However, as explained above and in sections II.C.3 and III.A, these *Guidelines* recommend certain minimal safe work practices even if Federal regulations do not require them.

2. Stabilize Deteriorated Paint

Owners should stabilize all deteriorated paint that is known or presumed to be lead-based, or address the problem otherwise, such as through component replacement, or abatement of the deteriorated paint. Paint stabilization includes repair of conditions that may be contributing to the paint deterioration (such as deterioration of or damage to the building component, or malfunctioning doors and windows causing friction or impact) as well as surface preparation, and repainting. Stabilization may also involve repair of any exterior and interior water leaks that are causing paint deterioration and repair or replacement of rotted components, defective plaster, loose wallpaper, and missing door hardware needed to eliminate impact damage. Prepare the surface using wet methods. When removing paint, do not use prohibited practices listed in section III.C.1, above. Clean and, if necessary, degloss surfaces before repainting. Select and apply primer and topcoat according to the manufacturer's instructions. Clean-up the area thoroughly after the work. Detailed guidance on methods of paint stabilization is provided in section III of Chapter 11. Section IV of Chapter 11 provides guidance on treatment of friction, impact, and chewable surfaces.

3. Repair Failed Lead Hazard Controls

Owners should repair or replace any previous lead-based paint hazard control treatments that are no longer performing as designed. Encapsulations may become loose from the substrate. Wall paneling or siding may be damaged and no longer completely enclose a surface with lead-based paint. Coverings of lead-based paint on floors and stairs may become worn or loose. Ground covers may die, erode, or become worn, loose or damaged, exposing bare soil that is known to be a hazard. Guidance on encapsulation is provided in Chapter 13, specifically recommending a patch test to confirm that an encapsulant is compatible with a particular substrate. Methods of enclosing lead-based paint are explained in Chapter 12 (for abatement methods such as installing wallboard or paneling or exterior siding) and Chapter 11 (for interim control methods such as installing aluminum coil stock, or covering floors and stair treads). Chapter 11 also provides guidance on interim treatments of window friction surfaces, and coverings of bare soil. Note that failure of a lead hazard control may indicate that a different treatment should be used. See section I.A of Chapter 11 for a discussion of conditions in which some interim controls are likely to be ineffective.

4. Clean-up Dust and Debris

Upon completion of a paint-disturbing maintenance, repair, or renovation job, workers should thoroughly clean the work area, adjoining spaces, and any passageways used to access the work area. The area to be cleaned depends whether the job is considered high- or low-dust. See Chapters 8 and 14.

On a continuing basis, dwelling units and common areas should be kept free of obvious accumulations of dust and paint-related debris that exceed normal housekeeping standards. In rental properties, the owner should call potentially hazardous dust and debris to the attention of the tenant if cleaning is the resident's responsibility. All units should be cleaned at turnover, and window troughs should be cleaned at that time.

5. Control Chewable Surfaces

In spaces frequented by children under age 6, chewable surfaces with evidence of teeth marks should be covered with a puncture-resistant material, or the paint should be removed and the surface repainted. Two options for covering are aluminum coil stock or a hard, puncture-resistant encapsulant. Section IV of Chapter 11 provides guidance on covering chewable surfaces. Paint removal methods are discussed in Chapter 12.

6. Make Surfaces Smooth and Cleanable (Optional)

Horizontal surfaces (such as floors, stair treads, interior window sills, and window troughs) that are rough, cracked, pitted or porous should be made smooth and easily cleanable by covering or coating them with an appropriate material such as metal coil stock, polyurethane, sheet vinyl, or linoleum.

7. Inform Residents About Lead-Based Paint Hazards and Request Their Cooperation

Owners should inform residents about lead-based paint hazards so they will comply with occupant protection measures, such as staying out of work areas, respecting dust-containment installations, informing the landlord of deteriorated paint, keeping their units clean, and avoiding excessively long hot showers in inadequately ventilated bathrooms. The EPA's Pre-Renovation Education (PRE) rule, as amended by the EPA's Renovation, Repair, and Painting (RRP) Rule, requires persons performing, for compensation, any kind of renovation activity that is more than the minor repair and maintenance activities threshold described in Section II.C.3, above to provide a lead-information pamphlet to owners and residents prior to beginning work (40 CFR Part 745, subpart E). Detailed information on this informational requirement can be found at <http://www.epa.gov/lead/pubs/leadrenf.htm>.

In housing receiving HUD assistance that is covered by the Lead Safe Housing Rule, the occupants must be notified within 15 days of the results of a lead evaluation or the presumption that lead-based paint or lead-based paint hazards are present, and within 15 days of results of lead hazard control activities (including clearance examination results and where any lead-based paint remains in the work areas) after the work is completed.

8. Perform Clearance Examinations to Check Dust-Lead Levels

HUD recommends that clearance examinations be performed after completion of maintenance and renovation work and associated clean-up when work exceeds the *de minimis* level, and requires this for housing receiving Federal assistance. EPA requires clearance after abatement projects, but not after other work. A clearance examination consists of a visual assessment for deteriorated paint, dust and debris; taking samples of dust on horizontal surfaces (floors, interior window sills, and window troughs); and testing the samples for lead. Clearance examiners should wait a minimum of one hour after the final clean-up of the work before collecting wipe samples of dust. Testing should be done by a laboratory recognized by EPA for analysis of lead in wipe samples. Workers and supervisors should not know where the wipe samples will be taken. Clearance should be performed by a person certified to perform clearance examinations in the State or Tribal area (usually a risk assessor, a lead-based paint inspector, or a sampling

technician). Clearance procedures are described in Chapter 15 and/or ASTM 2271, "Standard Practice for Clearance Examinations Following Lead Hazard Reduction Activities in Single-Family Dwellings and Child-Occupied Facilities." (www.astm.org/Standard/index.shtml)

HUD does not require clearance in housing receiving Federal assistance if the area of paint disturbed by the work is no more than HUD's *de minimis* level defined at section II.C.3. For housing not covered by HUD's Lead Safe Housing Rule, these *Guidelines* recommend that, as a quality control check on their training and the project supervision, clearance examinations, including dust sampling, be conducted after maintenance jobs exceeding the *de minimis* level if the work is performed by newly trained workers, until three consecutive clearances of their jobs are passed on initial examination (i.e., on the first try), even if clearance is not required by regulation. Project supervisors (whether they are certified renovators or abatement supervisors) should always conduct a visual assessment of the work area, adjacent rooms, and passageways used by workers to determine that the clean-up, as well as the maintenance work, has been done properly; this visual assessment is required by HUD for work exceeding its *de minimis* level, and by EPA for renovation, repair, or painting work exceeding its minor repair and maintenance activities level (section II.C.3, and 40 CFR 745.83) and for all abatement work (Chapter 12, and 40 CFR 745.227(e)(8)(i)).

9. Addressing Bare Soil and Sandboxes

If the conditions described above in section II.E apply, all bare soil should be covered (see Figure 6.4). See section VI of Chapter 11 for guidance on soil-hazard controls.

If there is a sandbox containing sand that has not been tested for lead, the owner should:

- ◆ Test the sand and, if it is a hazard, replace it with sand with lead content of less than 200 µg/g if possible (this is best practice) but certainly less than 400 µg/g, which is the EPA requirement;
- ◆ Omit testing and replace the sand with new sand with the same lead content as in option (a); or
- ◆ Remove the sandbox and the sand.

D. Qualifications of Firms, Workers, and Clearance Examiners

Workers performing lead-safe maintenance and lead-safe renovation must be supervised by a certified renovator working for a certified renovation firm if the amount of paint being disturbed is above the EPA's minor repair and maintenance activities threshold. If the housing is receiving federal housing assistance, the workers need to be certified renovators

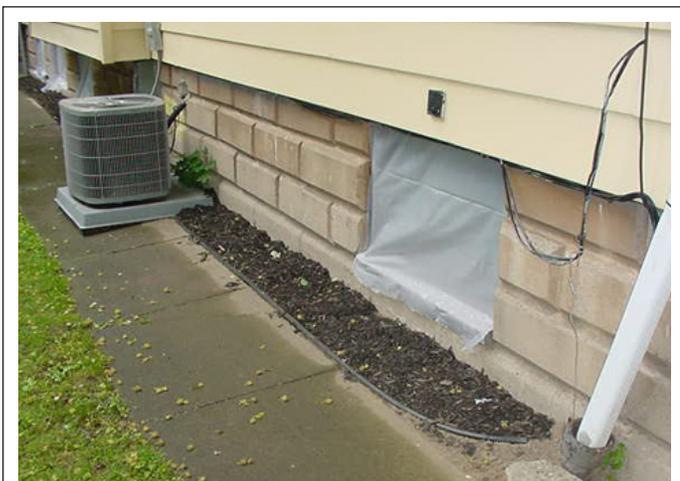


FIGURE 6.4 Bare soil in Figure 6.3 covered with mulch (the window was sealed during the process of controlling the bare soil).

themselves, and be supervised by a certified renovator working for a certified renovation firm if the amount of paint being disturbed is above HUD's *de minimis* threshold. See section IV.C.2, below, for information on training courses.)

Note that an owner of rental property working on a rental unit must establish a renovation firm that is certified by the EPA or the State, as applicable. Only an owner working on the housing unit in which only she and, if applicable, her family, but no other tenants, live is exempt from this firm certification requirement. (See Section II.C.3, above, about the thresholds.)

Persons performing clearance examinations must be certified by EPA or an EPA-authorized State, Tribe, or Territory (as applicable) as a risk assessor, a lead-based paint inspector, or a sampling technician, as allowed.

IV. Managing Ongoing Lead-Safe Maintenance

This section describes how an ongoing lead-safe maintenance program can be developed and managed. For multi-family housing, the lead-safe maintenance program should be included in the Lead Hazard Control Plan discussed in Chapter 11 (see Section II.A of that chapter).

A. Determining the Scope of the Program

At the outset, the owner should determine in writing exactly what the scope of the program is for the property in question. Some objectives are common to all properties, but there are several variations and options that are determined by Governmental regulation and the choice of the owner.

All lead-safe maintenance programs should include periodic visual assessments to identify deteriorated paint, paint-related debris, and excessive visible dust. All programs should also take steps to correct identified problems to the extent that they are the responsibility of the owner, and should use lead-safe work practices in doing so. All programs should also use lead-safe work practices when making any other paint-disturbing repairs and renovations. Clearance examinations should be included as required or otherwise appropriate. Finally, all programs should include communications with residents about lead-based paint hazards, including complying with the EPA Pre-Renovation Education Rule, and seeking residents' cooperation in cleaning their units frequently to keep dust accumulation to a minimum and reporting occurrences of paint deterioration, failed lead hazard controls (if applicable), and bare soil (if applicable) so that owners can promptly correct situations that are or may be lead-based paint hazards.

It should also be remembered that the HUD-EPA Lead Disclosure Rule must be observed. Owners of pre-1978 rental properties that are covered by that Rule must, among other requirements discussed in Appendix 6, provide the lead warning statement, and the EPA-approved pamphlet, and must disclose any actual knowledge, records and reports of lead-based paint and lead-based paint hazards to prospective tenants. Current tenants must be told of any new knowledge, records and reports at the time of lease renewal when lease conditions change. Disclosure to buyers prior to sale is also required; in addition to the requirements for rentals, sellers must provide an opportunity (typically 10 days) for the prospective buyer to conduct a lead-based paint inspection and/or risk assessment, and provide the buyer with the reports and records of lead-based paint and lead-based paint hazards.

Beyond these basic elements are a number of questions that owners or managers should answer in preparing to determine the scope and nature of their ongoing lead-safe maintenance program:

1. *Have lead-based paint hazards been identified through a risk assessment and, if so, have the hazards been controlled?* If hazards been identified but not yet controlled, they should be controlled promptly. If hazards have been controlled, the controls should be inspected during visual assessments and repaired if found to be failing.
2. *Do laws or regulations require that soil-lead hazards be controlled?* If so, visual assessments should include inspection of the grounds to identify bare soil, and bare soil should be covered according to guidance in this chapter and either Chapter 11 or 12. (If soil-lead hazard controls are in place, they should be identified in the answer to question 1, above.)
3. *Do laws or regulations require that floors, interior window sills, window troughs, or other horizontal surfaces be kept smooth and cleanable?* If yes, the condition of these surfaces should be visually assessed periodically and corrected if found to be rough and difficult to clean. If no, the owner may disregard the question of smooth and cleanable surfaces, or the owner may choose to maintain these surfaces in a smooth and cleanable condition.
4. *Do laws or regulations require that chewable surfaces be controlled?* If yes, the condition of these surfaces should be visually assessed periodically and corrected. If no, the owner may disregard the question of chewable surfaces, or the owner may choose to remove any lead-based paint from them.
5. *Do laws or regulations require that a clearance examination, including dust testing, be conducted after all paint-disturbing work, or that disturb more than a de minimis amount of paint?* If yes, a clearance examination must always be conducted. If no, clearance examinations should be conducted at the frequencies stated in section III.C.8, above.
6. *Do laws or regulations require that current residents be informed of the results of the clearance examination?* If yes, residents should be informed as soon as feasible, and within the required period. For example, for federally-assisted target housing, HUD requires tenant notification of hazard reduction activity within 15 days; see section III.C.7, above. If no, release of such information is at the option of the owner. For renovation, repair, or painting work in target housing that exceeds the EPA's minor repair and maintenance activities threshold, the renovation firm must, provide specific information about the test kit sampling or clearance examination within 30 days to the person who contracted for the renovation; EPA does not require notification of residents. Note, also, that new information on lead-based paint and lead-based paint hazards, such as clearance examination results, must be provided to current residents at the time of lease renewal under the HUD-EPA Lead Disclosure Rule (which applies to almost all pre-1978 housing).
7. *Do laws or regulations require only that ongoing lead-safe maintenance be carried out in dwelling units occupied by children under age 6, and common and exterior areas associated with those dwelling units?* If yes, lead-safe maintenance in other units is optional. This situation arises, for example, with:
 - ◆ HUD-assisted tenant-based rental assistance (under the housing choice voucher program), for which the Lead Safe Housing Rule applies only to dwelling units in target housing occupied or to be occupied by families or households that have one or more children of less than 6 years of age, common areas servicing such dwelling units, and exterior painted surfaces associated with such dwelling units or common areas. Common areas servicing a dwelling unit include those areas through which residents pass to gain access to the unit and other areas frequented by resident children of less than 6 years of age, including on-site play areas and child care facilities. (24 CFR 35.1200(b)(1))

- ◆ Some State and local jurisdictions require ongoing lead-safe maintenance in certain housing. For example, an owner of housing in Massachusetts who obtains a Letter of Interim Control must implement an ongoing lead-safe maintenance program (105 Code of Massachusetts Regulations 460.105(E), Maintenance and Monitoring). In New York City, rental housing “[o]wners must prevent the reasonably foreseeable occurrence of lead hazards and remediate them, and the underlying defects that may cause lead hazards, using safe work practices in apartments [and] in common areas.” (Local Law 1 of 2004 – A Summary. Department of Housing Preservation and Development. City of New York. See also title 28 Rules of the City of New York § 11-02, Owner’s Responsibility to Remediate, and § 11-04, Investigation for Lead-based Paint Hazards, ¶ (a).)

8. *Is lead-based paint known to be present?*

The property owner or manager must presume that all paint is lead-based paint, and that all deteriorated paint is a lead-based paint hazard until:

- ◆ an inspection is conducted, or
- ◆ chemical spot test kit testing determines that lead-based paint is absent on building components to be worked on under the RRP Rule.

If an inspection was conducted and no lead-based paint was found, the property is exempt from federal lead-based paint regulations, and lead-safe maintenance is not necessary, although the precautions recommended at the conclusion of section I of this chapter, and in section II.C.3, should be observed.

If an inspection was conducted and lead-based paint was found, has it been removed?

- ◆ If the lead-based paint has been removed, the property may be exempt from the federal lead-based paint regulations. See Appendix 6 for regulatory requirements before the property can be considered to be exempt.
- ◆ If the paint has not been removed, lead-safe maintenance procedures need to continue, focused on the remaining surfaces with known or presumed lead-based paint. (See Chapter 7 for how to extend the knowledge of lead-based paint status from surfaces that were sampled to surfaces that were not sampled).

B. Assignment of Responsibilities

Owners or managers should assign each of the following ongoing lead-safe maintenance responsibilities to a specific individual and should describe the responsibilities in writing. Based on the size of the organization responsible for maintaining the property (including staff and, possibly, maintenance supervision contractors), and the skill, knowledge, training and experience of the personnel involved, an individual may have one or more than one area of responsibility.

- ◆ **Managing visual assessments**, which includes assuring that visual assessments are performed at all units, areas, and surfaces at the recommended frequency; determining what items should be looked for in visual assessments; ensuring that persons performing visual assessments are trained in identifying deteriorated paint and other items to be observed, and that they know how to record on Form 6.0 or similar form all observations made during the visual assessments.
- ◆ **Ensuring that workers performing paint-disturbing work are working safely and in a lead-safe manner.** This includes ensuring that workers are following OSHA requirements (or the State

occupational safety and health requirements, if applicable) and are using lead-safe work practices in which they have been trained by becoming certified renovators or, in HUD-assisted housing, becoming certified lead-based paint abatement workers or supervisors, or being supervised by a certified lead-based paint abatement supervisor; or, in unassisted housing, being supervised by a certified renovator who has provided them with project-specific on-the-job training in lead-safe work practices. Employers are responsible for instituting engineering and work practice controls including administrative controls to the extent feasible to reduce employee exposure to lead. If those controls are feasible but not adequate to reduce exposures below OSHA's permissible exposure limit for lead, they must be supplemented with (not replaced by) appropriate respiratory protection. (See OSHA's lead in construction standard, 29 CFR 1926.62, OSHA's summary of the standard at its appendix B; and Chapter 9 and Appendix 6 of these *Guidelines*.)

- ◆ **Maintaining records** on the existence of lead-based paint and lead hazard controls, and on the performance of lead-safe maintenance, including visual assessment records and records of completion of maintenance and renovation work and clearance examinations. If the work is done by employees of the owner or manager, maintaining records in accordance with the OSHA lead in construction standard (29 CFR 1926.62(n)). (See Chapter 9 and Appendix 6 of these *Guidelines*.)
- ◆ **Determining exactly what lead-safe work practices should be used on each paint-disturbing job**, which includes determining whether the specific job will disturb paint that is known or presumed to be lead-based, whether the job will be a low-dust or high-dust job, and what occupant protection and worksite preparation methods are appropriate to the job. (See chapters 8 and 11 of these *Guidelines*.)
- ◆ **Modifying the work order system** to include necessary information for the maintenance workers on lead-safe work practices for each job.
- ◆ **Handling communications with residents**, including compliance with the EPA Pre-Renovation Education rule (PRE), and HUD's Lead Safe Housing Rule, and notifying residents of the results of environmental testing before work is begun (if any), the results of lead hazard controls (if any), and the results of clearance dust testing and cleaning verification.



FIGURE 6.5 Unit turnover is an excellent time to conduct the visual assessment and perform lead-safe maintenance activities.

- ◆ **Purchasing and maintaining supplies and equipment**, including lead information pamphlets, respirators, protective sheeting, workplace barrier tape, high-quality vacuums (preferably HEPA), disposable shoe coverings, protective clothing, and cleaning equipment.
- ◆ **Monitoring the work and managing clearance**, including inspecting ongoing work for lead-safe work practices, inspecting jobs after clean-up, and arranging for clearance examinations.

For small staffs, a single person may handle all of these tasks; for larger staffs, coordination is essential. If there is only a single maintenance person and owner/supervisor, a written program may not be essential, but it is quite useful as a reminder of what needs to be done (see Figure 6.5).

C. Description of Responsibilities

1. Managing Visual Assessments

The main objectives of managing visual assessments are to assure that visual assessments are performed at all dwelling units, common areas, exterior painted surfaces and grounds (if required or recommended) at the frequency described in section II.A, above, and that persons performing visual assessments know what to look for in a given area and how to record their observations.

It is suggested that a list be made of all spaces (i.e., dwelling units, common areas, exterior surfaces) to which visual assessment for lead-safe maintenance applies at the subject property, and that the date of each visual assessment of each space on the list be recorded, including those made at turnover or during other maintenance visits. Then, at the end of a designated 12-month period, the list will reveal which spaces have not yet been visually assessed. Owners or managers should establish the policy that visual assessments be conducted at turnover and at the time of other maintenance visits whenever possible. An example of a simple form for this purpose is provided at Form 6.2 at the end of this chapter.

Owners or managers should assure that each person performing a visual assessment:

- ✦ **Has completed a recognized course on visual assessment of deteriorated paint**, such as HUD's online course (at <http://www.hud.gov/offices/lead/training/visualassessment/h00101.htm>.) or a similar State course, or an EPA-, State- or Tribally-accredited lead-based paint inspection or risk assessment course.
- ✦ **Knows how much visible dust and paint-related debris is considered excessive.**
- ✦ **Knows whether the area in question has lead hazard controls in place** and, if so, what and where, and what constitutes failure.
- ✦ **Knows how to recognize structural or substrate problems** that may be causing paint deterioration or failure of hazard controls.
- ✦ **Knows whether to look for bare soil**, and if so, where, how to distinguish between play areas and the rest of the yard, how to determine if the total area of bare soil in the rest of the yard exceeds HUD's small amount threshold (9 square feet per property), and if the bare soil is contaminated with dust, paint chips and/or debris.
- ✦ **Knows whether to look for other optional conditions that the owner may wish to include in the visual assessment**, such as whether floors, interior window sills and window troughs are smooth and cleanable, or whether there are chewable surfaces.
- ✦ **Knows how to record observations** on forms or worksheets provided for the purpose.

2. Determining that Firms and Workers Are Qualified

Property owners and managers of target housing must ensure that the maintenance firms and workers conducting work covered by the EPA's Renovation, Repair, and Painting (RRP) Rule (see Appendix 6) are certified renovation firms which have the work supervised by certified renovators and the workers either certified renovators or property trained under the RRP Rule, as described in Section III.D, above.

3. Maintaining Records

The owner or manager should keep the following forms (all located at the end of the chapter) or reports to facilitate and document the lead-safe maintenance program:

- ✦ **Reports of visual assessments** (Forms 6.0 and 6.1, or similar forms).
- ✦ **A log of the dates of visual assessments** (Form 6.2, or similar form).
- ✦ **An inventory of lead-based paint testing results or presumption of lead-based paint or hazards, if any** (Form 6.3, or similar).
- ✦ **An inventory of lead hazard controls, if any** (Form 6.4, or similar).
- ✦ **Lead-safe maintenance work orders, if used** (Form 6.5, or similar).
- ✦ **Reports of clearance examinations.**

Inventory of lead-based paint testing. Individuals assigning maintenance tasks will need to determine whether work on certain surfaces may result in a lead hazard. The best method for doing this is to have a certified lead-based paint inspector or risk assessor determine whether lead-based paint is present (using the protocols in Chapter 7) and then maintain an easy-to-use, surface-by-surface inventory, such as that shown as Form 6.3 at the end of this chapter and illustrated by example in Form 6.3a. If paint testing is not conducted, all painted surfaces in dwellings constructed before 1978 should be presumed to contain lead-based paint, until proven otherwise. While this presumption could result in erroneously requiring controls for working on paint that does not contain lead, it would be dangerous to assume that the paint does not contain lead. A maintenance supervisor could fail to recommend controls where they are needed, resulting in a poisoned worker or child.

It is important to note that most painted surfaces in dwellings constructed before 1978 do *not* contain lead-based paint. This is especially true of buildings constructed after World War II (Jacobs, 2002). It is not unusual for entire buildings built in the 1970s to have no lead-based paint. Therefore, it frequently pays to test. The cost of testing can be returned in reduced maintenance and renovation costs. Also, if it is *known*, through *documentation*, that certain building components are new or were replaced or new materials added after 1977, it can be assumed that they do not contain lead. For example, if all exterior doors and windows in a building are known to have been replaced in 1981, these surfaces do not need to be included in the inventory of components known or presumed to contain lead-based paint. It is advisable, however, to have written documentation of the dates such additions or replacements. Reuse or reinstallation of old or antique architectural components should also be avoided.

Depending on the size and organization of the maintenance operation, the inventory could be organized by room (appropriate for small owners with only one or a few single-family dwellings) or by unit/apartment building (appropriate for larger landlords). For computerized maintenance systems, the lead-based paint inventory system can be added to the database to flag those jobs that could produce lead hazards. If workers or supervisors are unsure about whether or not they are working on a leaded surface, they can quickly consult the inventory.

Inventory of lead hazard controls. If lead hazard controls, other than *de minimis* paint stabilization or total removal of the lead-based paint, have been conducted on the property, it will be necessary to inform the visual assessor of their existence. Therefore, it is recommended that owners maintain a simple inventory of lead hazard controls that lists the location, type of hazard, method of control, and date of installation. Form 6.4 provides an example of such an inventory form.

4. Determining the Lead-Safe Work Practices To Be Used on Each Job

The methods used to protect residents, workers, and the environment on a given maintenance or renovation job depend on many factors, including the amount and dispersal of dust likely to be created by the job (which in turn is affected by the size of the surface(s) needing work, the nature of the work, and the methods being used); the location of residents; the building layout; and the proximity of the building to other properties. Consult Chapter 8 for guidance on determining whether a job is likely to generate low or high amounts of dust and on selecting occupant protection and worksite preparation methods appropriate to the job. Absent other comprehensive training on this subject (see courses described above in section IV.C.2), Chapter 8 is essential to understanding lead-safe maintenance. Also, Chapter 11 (Interim Controls) should be consulted for work practices to be used in various types of paint-disturbing work (such as paint stabilization or repair of windows or doors), and Chapter 9 provides further information on worker protection.

5. Modifying the Work Order System

Work order systems should be modified (if they have not yet been) to reflect whether the job will disturb lead-based paint, whether the job is low- or high-risk (see guidance in Chapter 8), and which protective measures will be required. Even if an owner does not have a formal work order system developed, the hazard warning information must be transmitted to those conducting the work.

To account for lead hazards, the owner's work order form will need to be modified (if it has not yet been). Specifically, a check-off box should be added to indicate that the work will disturb known or presumed lead-based paint. If this box is checked, the supervisor or worker should receive a second form (see Form 6.5 "Lead-Safe Maintenance Work Order" at the end of this chapter) with detailed information on required work practices and control measures.

6. Communicating with Residents

The EPA's Pre-Renovation Education Rule requires that persons who perform, for compensation, most renovation, repair or painting of housing built before 1978 provide, before beginning work to the owner of the housing, and to the occupant of each affected unit (a unit in which the work is being done, and/or a unit for which work in a common area that will affect that unit) (40 CFR 745.84):

- ◆ the renovation-specific pamphlet “Renovate Right: Important Lead Hazard Information for Families, Child Care Providers and Schools,” (www.epa.gov/lead/pubs/renovaterightbrochure.pdf, or, in Spanish, www.epa.gov/lead/pubs/renovaterightbrochuresp.pdf) or an EPA-approved State or Tribal alternate pamphlet; and
- ◆ information about how and where the project will be conducted, including the general nature and locations of the planned renovation activities; the expected starting and ending dates; and
- ◆ if the work is being conducted in common areas, ensure written notification to each affected unit with the information above and describing how the occupant can obtain the pamphlet, at no charge, from the firm performing the renovation.

This pre-renovation education is not required for: (1) minor repair and maintenance activities (see section II.C.3, above), (2) emergency renovation operations, and (3) renovations in which a certified lead-based paint inspector, certified risk assessor, or the certified renovator for the project has determined that the components disrupted by the renovation are free of lead-based paint. Detailed information on implementing pre-renovation education is provided in the EPA’s *Small Entity Compliance Guide to Renovate Right*, a handbook on the RRP rule for contractors, property managers and maintenance personnel working in homes and child-occupied facilities built before 1978 (EPA publication EPA-740-K-10-003; www.epa.gov/lead/pubs/sbcomplianceguide.pdf).

7. Purchasing Supplies and Equipment

The following is a list of some of the more important specialized materials needed to carry out lead-safe maintenance. These items, with the possible exception of quality door mats, are available at most full-service hardware stores (see Figure 6.6).

- A. Vacuum.** If possible, a high-quality, high efficiency particulate air (HEPA) vacuum should be used in cleaning. If required by EPA, HEPA vacuums must be used. If construction work is being performed, OSHA’s lead in construction regulation 29 CFR 1926.62(h)(4) requires HEPA vacuums for vacuuming. A HEPA vacuum has a filter capable of removing particles of 0.3 microns or larger from air at 99.97 percent or greater efficiency. The filters on ordinary vacuums do not capture very tiny particles of lead, allergens, and other contaminants but rather let them pass through the filter and out the exhaust. However, it is important to note that there is more to a vacuum than the filter. Other important factors that determine the effectiveness of a vacuum are suction (which is a function of the motor, the design of the suction tool, and the extent to which the rest of the system does not release air before it is supposed to), quality of construction (which may determine the durability of the machine and whether there are air pressure leaks before the filtration), and whether the vacuum has special tools, such as a beater bar or agitator attachment for carpets. Also, there are filters available that, while not HEPA, are better than those that formerly were standard on household and commercial vacuums.

Research has shown that high-quality non-HEPA vacuums are often as effective as, and sometimes more effective than, HEPA vacuums (California Department of Health Services, 2004; Rich, 2002; Yiin, 2002). Therefore, while these *Guidelines* recommend that a good HEPA vacuum should be used if possible, a high-quality household or commercial vacuum should be used if a HEPA vacuum is not available.

- B. Respirators.** Workers on high-dust jobs (see Chapter 8) should wear respirators that are rated N100 (HEPA) at a minimum. N100 rated disposable masks are available, but a fitted, half-face respirator is preferable because it is reusable and conforms to the face of the user, eliminating leaks. Disposable respirators can be \$5 to \$7, while a half-face respirator costs \$32 plus \$3 for set of cartridges. All determinations with regard to worker protection equipment, such as respirators and protective clothing, should be made in accordance with OSHA regulations for exposure monitoring and assessments. If dust levels are at or above OSHA's Permissible Exposure Limit, there are legal requirements under both 29 CFR 1910.1025 (Lead in General Industry) and 29 CFR 1926.62 (Lead in Construction) for personal protective equipment.
- C. Protective sheeting.** When lead-safe work practices are recommended, workers should use disposable, impermeable protective sheeting (such as heavy-duty polyethylene) as needed to cover floors, furniture, and HVAC ducts in the work area, construct dust-containing door flaps, and also to cover floors in passageways to and from the work area. Sheeting that is subject to the possibility of abrasion or puncture should be at least 6-mil thick, while other sheeting can be less thick.
- D. Protective clothing.** For high-dust jobs, it is recommended that workers either wear disposable protective suits (such as Tyvek™) or wear clothes that will be changed before leaving the work place and washed separately from the family laundry.
- E. Disposable shoe coverings.** An effective and relatively easy way to avoid tracking contaminated dust into non-work areas is for workers to wear inexpensive non-skid disposable shoe coverings when walking on protective sheeting and then remove the shoe coverings whenever they step off the protective sheeting.
- F. Detergents, buckets, mops and rags for wet cleaning the work area.** The supplies and equipment for wet cleaning the work area are all standard, commonly used cleaning materials (see Figure 6.6). The detergent should be a common cleaning solution, not trisodium phosphate (TSP). Not only has TSP been banned in some areas because of negative effects on the ecology of aquatic systems, but also research indicates that phosphate content is not associated with effectiveness in removing lead-contaminated dust from residential surfaces (EPA, 1997a; EPA, 1998). When cleaning floors, workers should have three buckets: one for the cleaning solution, one with a mop-squeezing tool, and one with clean water for rinsing the floor. For floors, the mop should be a string mop; sponge mops work more as a sweeping tool since it has less surface area to trap dust than string mops. Rags and sponges are recommended for cleaning walls, interior window sills, window troughs, counters, shelves and other horizontal surfaces.



FIGURE 6.6 Clean-up supplies.

Some experienced contractors have abandoned mopping in favor of a “wet wipe and toss” procedure. This method requires a large quantity of clean rags, which are put into a bucket of detergent and water solution. The worker pulls a rag from the bucket, wrings it out over the bucket, wipes clean an area of about 16 square feet, throws the used rag away, pulls another rag, and so on. If the detergent requires rinsing, repeat with clean water. For sills, troughs, counters, shelves, walls, and tight floor spaces like behind toilets, the wet wipe and toss method is the best alternative to the mop. Some contractors prefer this method even for large floor areas. A major advantage is that it avoids the potential problem of re-contaminating the area by cleaning with dirty water. This method may also use less water than a mop. The rags are commercially available disposable cloth scraps or paper products. Cloth rags usually are not cleaned and reused because of the risk of contaminating other laundry (White, 2003).

- G. Door mats.** Lead dust from outside the building can be tracked inside on the bottom of shoes, wheels on carts, and bare feet. A good doormat can be very effective in reducing the introduction of exterior dirt, dust, moisture, and various contaminants in residential and nonresidential buildings, *provided the mat is vacuumed frequently*. A good mat should have dense, synthetic fibers on a waterproof backing and should be easily cleaned by vacuuming. For best results, it should be placed in a dry location inside an exterior door, and, if possible, it should be big enough to allow people to take three or four steps on the mat. A small mat (e.g., two feet by three feet) is effective if people wipe their shoes on it. The better mats tend to be designed for commercial use and may not be available at hardware stores, except by special order.

8. Monitoring the Work and Arranging for Clearance Examinations

The person who monitors maintenance or remodeling work should be trained in lead-safe work practices and should be familiar with clearance examination procedures. There are three stages of involvement: (1) *while paint-disturbing work is underway*; (2) *during and after clean-up*; and (3) *at the time of clearance*.

The following is a minimal list of determinations that should be made while work is underway:

- ✦ ***Has the worksite been set up properly***, in accordance with the work order and guidance in Chapter 8, and does the setup appear to be working as planned?
- ✦ ***Are residents being kept out of the work area?***
- ✦ ***Are workers avoiding the use of prohibited work practices?***

- ✦ *Is waste being handled correctly?*
- ✦ *Are workers using worker protection methods appropriate to the job?*

Clean-ups should be observed in process on a random basis to assure that all horizontal surfaces are being cleaned, and every job should be inspected visually after clean-up to assure that no visible dust and debris are present in the work area and in other rooms and passageways used by the workers.

The person responsible for arranging for clearance should retain a person or firm certified to perform clearance examinations in the State. Multi-family property owners can use in-house staff to perform clearance, provided the clearance examiner is certified in the State or Tribal area and the clearance examiner does not participate in doing the maintenance or renovation work and the clean-up. Clearance should be conducted as required by regulation. Even if regulations do not require clearance, clearance examinations should be conducted randomly at a rate of at least one per twenty jobs for crews demonstrating a good record of achieving clearance on the first three tries. The timing of the clearance examination is important. Clearance dust sampling should be performed no less than one hour after clean-up has been completed to allow time for any fallout of fine dust particles. Arrangements must be made for the clearance examiner to have access to the worksite. Chapter 15 explains what a clearance examiner does and what the Federal dust-lead standards are for clearance.

On-site Dust Testing. Owners and managers should be aware that methods exist for reliably analyzing wipe samples on-site instead of in a fixed laboratory. These include portable X-ray fluorescence (XRF) analysis and anodic stripping voltammetry (ASV) (EPA, 2002b; Clark, 2002). These methods may provide testing results much more quickly than fixed-laboratory analysis because samples do not have to be transported to the laboratory. Therefore the methods may save time and money, reduce relocation difficulties, facilitate cooperation with tenants, and accelerate environmental investigations in cases of lead-poisoned children.

In States and Tribal lands where EPA is operating a lead program, wipe samples for a clearance examination must be analyzed by a laboratory or testing firm recognized by EPA under the National Lead Laboratory Accreditation Program (NLLAP). If, in these States, an NLLAP laboratory wishes to perform on-site analyses of dust wipe samples, they may do so. In States or Tribal lands where the State or Tribe is operating an EPA-authorized lead program, the same requirements generally apply, although there may be some differences (EPA, 2002a). While EPA regulations and procedures apply only to abatement activities, HUD regulations and many State regulations apply the same procedures to non-abatement activities.

In addition, any person who is trained and otherwise qualified to operate the XRF instrument or use the ASV method may use these methods to conduct *preliminary* dust testing to determine whether the clearance area is clean and ready for the clearance examination. A person conducting a preliminary screen does not have to be a technician working for an NLLAP-accredited laboratory. Owners and contractors may wish to use such screening tests to minimize the likelihood of clearance failure. State regulations on the use of devices with radioactive elements must be observed.

Form 6.3a Completed Lead-Based Paint Inventory for a Room/Space

Dwelling Unit Identifier 234

Room Identifier Dining Room

Surface	Known Lead-Based Paint	Suspected Lead-Based Paint	No Lead-Based Paint
Floors			X (6/3/2005)
Lower Walls		X	
Upper Walls		X	
Chair rail		X	
Interior window trim		X	
Window trough	X		
Ceiling		X	
Baseboards			X (6/3/2005)
Doors			X (4/15/2006)
Door trim		X	
Crown molding		X	
Other trim, mantels, etc.		X	
Exterior siding	X		

Form 6.5 Lead-Safe Maintenance Work Order

Reference to work order number _____

Equipment and supplies needed (check items needed):

- Protective sheeting (e.g., polyethylene) Approximate amount (in yards) _____
- Disposable shoe coverings
- Protective clothing
- Respirators
- Vacuum (HEPA preferable, if available)
- Cleaning materials (detergent, buckets, mops, and rags)
- Spray bottle for misting
- Other _____

Worksite preparation (check items needed):

- Cover whole floor with protective sheeting
- Cover floor approximately five feet from work surface
- Cover floors in hallway to work area
- Cover furniture Move furniture
- Close off doorways(s) to room with protective sheeting
- Relocate occupants temporarily Just keep occupants out of work area
- Shut down HVAC system while paint-disturbing work is underway
- Other _____

Mist down paint surfaces to be disturbed (*except around electrical outlets*) Yes No

Clean-up:

Area(s) to be cleaned: _____

Vacuum horizontal surface? Yes No

Wet wash? Yes No

Clean window troughs? Yes No

Disposal of waste will be done by _____

Will clearance dust sampling be conducted Yes No

References

- Amitai, 1991. Amitai, Y., M.J. Brown, J.W. Graef, and E. Cosgrove. "Residential Deleading: Effects on the Blood Lead Levels of Lead Poisoned Children," *Pediatrics* 88(5): 893–897.
- ASTM, E 2271. American Society for Testing and Materials, "Standard Practice for Clearance Examinations Following Lead Hazard Reduction Activities in Single-Family Dwellings and Child-Occupied Facilities," ASTM, 100 Barr Harbor Drive, West Conshohocken, PA.
- California Department of Health Services, 2004. Public Health Institute for California Department of Health Services, Childhood Lead Poisoning Prevention Branch and Environmental Health Laboratory Branch, "Evaluation of Household Vacuum Cleaners in the Removal of Settled Lead Dust from Hard Surface Floors," Final Report to U.S. Department of Housing and Urban Development, 2004.
- Clark, 2002. Clark, C.S., "Development of a Rapid On-Site Method for the Analysis of Dust Wipes Using Field Portable X-Ray Fluorescence," prepared for the U.S. Department of Housing and Urban Development, January 2002.
- EPA, 1997a. U.S. Environmental Protection Agency, *Laboratory Study of Lead-Cleaning Efficacy*, March 1997 (EPA 747-R-97-002). Available through nepis.epa.gov by searching for 747R97002.
- EPA, 1997b. U.S. Environmental Protection Agency, *Lead Exposures Associated With Renovation and Remodeling Activities: Summary Report*, May 1997 (EPA 747-R-99-001). Available through nepis.epa.gov by searching for 747-R-99-001
- EPA, 1998. U.S. Environmental Protection Agency, *Lead-Cleaning Efficacy Follow-Up Study*, October 1998 (EPA 747-R-98-008).
- EPA, 1999a. U.S. Environmental Protection Agency, "Lead Exposures Associated With Renovation and Remodeling Activities: Phase IV, Worker Characterization and Blood-Lead Study of R&R Workers Who Specialize in Renovation of Old or Historic Homes," March 1999 (EPA 747-R-99-001).
- EPA, 1999b. U.S. Environmental Protection Agency, "Lead Exposures Associated With Renovation and Remodeling Activities: Phase III, Wisconsin Childhood Blood-Lead Study," March 1999 (EPA 747-R-99-002).
- EPA, 2001. U.S. Environmental Protection Agency, Identification of Dangerous Levels of Lead, *66 Federal Register* 1206-1240, January 5, 2001; at 1227.
- EPA, 2002a. U.S. Environmental Protection Agency, "Questions & Answers About ETV Reports on Portable Technologies for Measuring Lead in Dust," December 2002.
- EPA, 2002b. U.S. Environmental Protection Agency, The Environmental Technology Verification Program (ETV), Verification Statements EPA-VS-SCM-50, 51, 52, 53 and 54. Prepared by Oak Ridge National Laboratory, Oak Ridge, Tennessee, August, 2002.
- Farfel and Chisolm, 1990. Farfel, M., and J.J. Chisolm, Jr., "Health and Environmental Outcomes of Traditional and Modified Practices for Abatement of Residential Lead-Based Paint," *American Journal of Public Health* 80:10, 1240–1245. ajph.aphapublications.org/cgi/reprint/80/10/1240

HUD, 2001a. *National Survey of Lead and Allergens in Housing, Final Report, Volume I: Analysis of Lead Hazards*, prepared by Westat, Inc. for U.S. Department of Housing and Urban Development, Washington, DC, April, 2001. http://www.nmic.org/nycclp/documents/HUD_NSLAH_Vol1.pdf

Lange, 2000. Lange, John H., K.W. Thomulka, "Effectiveness of Engineering Controls for Airborne Lead Exposure during Renovation/Demolition of a Commercial Building," *Indoor and Built Environment*, 2000:9, 207-215 (DOI: 10.1159/000057509).

Jacobs, 2002. Jacobs, D.E., R.P. Clickner, J.Y. Zhou, S.M. Viet, D.A. Marker, J.W. Rogers, D.C. Zeldin, P. Broene and W. Friedman, "The Prevalence of Lead-Based Paint Hazards in US Housing," *Environmental Health Perspectives*, 110(10):599, October 2002. <http://www.ncbi.nlm.nih.gov/pubmed/12361941>

NCHH, 2004. National Center for Healthy Housing, and University of Cincinnati Department of Environmental Health, *Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program: Final Report*, prepared for the U.S. Department of Housing and Urban Development, Washington, DC, May 1, 2004.

NIOSH, 1990. National Institute for Occupational Safety and Health, *Health Hazard Evaluation Report: HUD Lead Based Paint Abatement Demonstration Project*, HETA 90-070-2181.

Rabinowitz, 1985a. Rabinowitz, M., A. Leviton, and D. Bellinger, "Home Refinishing, Lead Paint, and Infant Blood Lead Levels," *American Journal of Public Health* 75(4): 403-404. ajph.aphapublications.org/cgi/reprint/75/4/403.pdf

Rich, 2002. Rich, David Q., G.G. Rhoads, L. Yiin, J. Zhang, Z. Bai, J.L. Adgate, P.J. Ashley and P.L. Lioy, "Comparison of Home Lead Dust Reduction Techniques on Hard Surfaces: The New Jersey Assessment of Cleaning Techniques Trial," *Environmental Health Perspectives*, 110(9): 889-893, September 2002. ehp.niehs.nih.gov/members/2002/110p889-893rich/rich-full.html

White, 2003. White, K. and G. Dewalt, Unpublished comments on proposed revisions to Chapter 14 of the HUD *Guidelines*, May 2003.

Yiin, 2002. Yiin, Lih-Ming, F.F. Rhoads, D.Q. Rich, J. Zhang, Z. Bai, J.L. Adgate, P.J. Ashley and P.J. Lioy, "Comparison of Techniques to Reduce Residential Lead Dust on Carpet and Upholstery: The New Jersey Assessment of Cleaning Techniques Trial," *Environmental Health Perspectives*, 110(12): 1-5, December, 2002. <http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.021101233>

Zhu, 2012. Zhu, J., E. Franko, N. Pavelchaka and R. DePersis. Worker Lead Poisoning during Renovation of a Historic Hotel Reveals Limitations of the OSHA Lead in Construction Standard. *Journal of Occupational and Environmental Hygiene*. 9:8. Published online June 25, 2012, published on paper, August 9, 2012. DOI: 10.1080/15459624.2012.700273