

Chapter 1: Introduction

I. Legislative Basis and Relationship to Federal Programs and Regulations	1-3
A. Legislative Basis	1-3
B. Intended Audience	1-3
II. Background on Childhood Lead Poisoning, Sources of Lead in the Environment, and the Evolution of Lead Poisoning Prevention	1-4
A. Childhood Lead Poisoning	1-4
1. Health Hazards.....	1-4
2. Prevalence Rates.....	1-5
3. Highest Risk Populations	1-5
4. Health Screening	1-5
5. Updated CDC Recommendations	1-6
B. Causes of Childhood Lead Poisoning.....	1-6
1. Lead in Residential Paint.....	1-6
2. Lead-Based Paint in Housing.....	1-6
3. Lead in Surface Dust.....	1-7
4. Lead in Soil	1-7
5. Other Causes of Lead Poisoning	1-8
C. The Evolution of Prevention Approaches	1-8
1. Medical Treatment of Poisoned Children (Tertiary Treatment).....	1-8
2. Screening and Case Management Programs (Secondary Prevention).....	1-8
3. Primary Prevention.....	1-9
III. The Title X Regulatory Framework.....	1-9
A. Definition of "Lead-Based Paint Hazard"	1-9
B. Regulatory Framework for Lead Hazard Control	1-10
1. Evaluating Lead Hazards.....	1-11
2. Controlling Lead Hazards	1-12
C. Requirements To Ensure Quality Control.....	1-13
1. Training and Certification	1-13
2. Accreditation of Training Providers	1-13
3. Health-Based Standards	1-13
4. Performance Standards for Testing and Abatement Products.....	1-13
5. Laboratory Accreditation.....	1-14
D. State and Local Regulations.....	1-14
IV. Organization and Use of the Guidelines	1-14
A. Chapter Organization.....	1-14
1. Chapters 1-4: Background Information	1-14
2. Chapters 5-7: Hazard Evaluation and Ongoing Maintenance.....	1-15
3. Chapters 8-10: Preparation for the Project	1-15



4. Chapters 11-15: Hazard Control, Cleanup, and Clearance	1-15
5. Chapters 16-18: Related Issues	1-16
6. Glossary and Appendices	1-16
B. Units of Measurement	1-16
C. Federal Lead Standards	1-17
REFERENCES	1-18
FIGURES	
Figure 1.1 Some paints contained 50% lead and were aggressively marketed.....	1-6
Figure 1.2 Deteriorated residential paint on house trim.....	1-7
Figure 1.3 Paint deterioration.	1-7
Figure 1.4 Title X's Lead Hazard Control Framework	1-11

Chapter 1: Introduction

I. Legislative Basis and Relationship to Federal Programs and Regulations

A. Legislative Basis

The *Guidelines* are issued pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, which is often referred to as Title X ("Title Ten") because it was enacted as Title X of the Housing and Community Development Act of 1992 (Public Law 102-550). The *Guidelines* are based on the concepts, definitions, and requirements set forth in Title X. Section III of this chapter describes the framework of concepts and definitions in Title X and the regulations issued pursuant to it.

As required by Section 1017, the *Guidelines* must be used for "federally supported work," which is defined in the Act as "any lead hazard evaluation or reduction activities conducted in federally owned or assisted housing or funded in whole or in part through any financial assistance program" of the Department of Housing and Urban Development, the Department of Agriculture or the Department of Veterans Affairs. The Act defines "federally owned housing" as "residential dwellings owned or managed by a Federal agency, or for which a Federal agency is a trustee or conservator." In this context, the term "Federal agency" includes HUD, the Department of Agriculture's Rural Development – Housing and Community Facilities Programs, the Savings Association Insurance Fund, the General Services Administration, the Department of Defense, the Department of Veterans Affairs, the Department of the Interior, and the Department of Transportation. The term "federally assisted housing" is defined in the Act as "residential dwellings receiving *project-based* assistance under programs including:

"(A) section 221(d)(3) or 236 of the National Housing Act;

"(B) section 1 of the Housing and Urban Development Act of 1965;

"(C) section 8 of the United States Housing Act of 1937; or

"(D) sections 502(a), 504, 514, 515, 516 and 533 of the Housing Act of 1949."

B. Intended Audience

These *Guidelines* were developed and have been revised to provide technical guidance to the many individuals and groups involved with, or affected by, lead-based paint in residential housing units, and, to the extent appropriate, child-occupied facilities (see Appendix 6) including:

- ◆ Lead-based paint abatement contractors and abatement supervisors.
- ◆ Residential renovation contractors.
- ◆ Residential painters and painting contractors.
- ◆ Building maintenance personnel.
- ◆ Lead-based paint risk assessors, paint inspectors and sampling technicians.
- ◆ Lead-based paint training providers.
- ◆ Contractor certifying or licensing agencies.

- ◆ Residential building owners and managers, including: public housing agencies and Tribally-Designated Housing Entities (TDHEs); private, nonprofit housing development organizations; and private, for-profit landlords, managers, and building owners.
- ◆ Federal agency staff, such as from HUD, EPA, CDC, USDA, GSA, DoD, VA, DOI, DOT, and other agencies that own or manage residential properties and/or child-occupied facilities.
- ◆ State and local housing and community development agencies.
- ◆ State and local health agencies.
- ◆ Architects and designers.
- ◆ Environmental laboratory personnel.
- ◆ Environmental laboratory accreditation organizations.
- ◆ Real estate agents and brokers.
- ◆ Property and casualty insurers.
- ◆ Lenders and appraisers.

These *Guidelines* are intended for use by trained and certified lead-based paint professionals. Under HUD and EPA regulations, contractors and individuals must be trained and/or certified to conduct inspections, risk assessments, lead-based paint hazard reduction activities, and clearance examinations. Firms performing renovations that disturb lead-based paint (including interim controls) must be certified in Renovation, Remodeling and Repair, and have an adequate number of Certified Renovators on each job to perform the job safely. Federal agencies have developed different resources for non-professionals, such as the “Lead Paint Safety Field Guide.” Various outreach and education documents are posted at: <http://www.epa.gov/lead/pubs/leadpbed.htm>, or may be requested by calling the National Lead Information Center at 1-800-424-LEAD (toll-free). Hearing- or speech-challenged individuals may access this number through TTY by calling the toll-free Federal Relay Service at 800-877-8339.

II. Background on Childhood Lead Poisoning, Sources of Lead in the Environment, and the Evolution of Lead Poisoning Prevention

As understanding of lead’s adverse health effects and the sources and pathways of exposure to children has improved, so has recognition of the seriousness of lead-based paint hazards.

A. Childhood Lead Poisoning

Despite steady and impressive progress in reducing blood-lead levels (BLLs) among the U.S. population, childhood lead poisoning remains a major preventable environmental health problem in the United States.

1. Health Hazards

Lead is highly toxic and affects virtually every system of the body. At high exposure levels, lead poisoning can cause convulsions, coma, and death. While adults can also suffer from excessive

lead exposures (discussed in Chapter 9), the groups most at risk are fetuses, infants, and children under age 6. At low levels, lead's neurotoxic effects have the greatest impact on children's developing brains and nervous systems, causing reductions in IQ and attention span, reading and learning disabilities, hyperactivity, and behavioral problems (Davis, 1993). These effects have been identified in many carefully conducted research studies (see the literature review in National Academy of Sciences, 1993). However, the vast majority of childhood lead poisoning cases go undiagnosed and untreated, because most poisoned children have no obvious symptoms.

2. Prevalence Rates

In October 1991, CDC formally revised its statement on *Preventing Lead Poisoning in Young Children* (CDC, 1991a), reducing its "level of concern" for childhood lead poisoning from the previous threshold of 25 micrograms/deciliter ($\mu\text{g}/\text{dL}$) to 10 $\mu\text{g}/\text{dL}$. (See section IV.B, below for a description of units of measurement for lead in blood, paint, dust, soil, air, and water.) This change was based on scientific evidence indicating that adverse health effects can occur at levels as low as 10 $\mu\text{g}/\text{dL}$. In August 2005, CDC estimated that 310,000, or 0.7%, of American children under age 6 have BLLs above 10 $\mu\text{g}/\text{dL}$ (CDC, 2005). More recent research suggests that such effects occur at levels well below 10 $\mu\text{g}/\text{dL}$ (see, e.g., the literature review in CDC ACCLPP, 2012). No blood lead threshold for adverse health effects has been identified in children.

3. Highest Risk Populations

Lead poisoning affects children across all socioeconomic strata and in all regions of the country. However, because lead-based paint hazards are most severe in older, dilapidated housing, the poor in inner cities are disproportionately affected. In many such neighborhoods over half of all young children have lead poisoning. The National Health and Nutrition Examination Survey (NHANES) reported that, in 1999-2002, non-Hispanic blacks and Mexican Americans had higher percentages of elevated BLLs than non-Hispanic whites (Schwemberger, 2005). Although the disparity in risk for BLLs greater than or equal to 10 $\mu\text{g}/\text{dL}$ by income and race are no longer statistically significant; disparities by race/ethnicity and income still persist at lower blood lead levels (Jones, 2009).

4. Health Screening

In 1990, CDC called for a phase-in of universal blood-lead testing of all young children (unless it can be shown that the community has no lead poisoning problem) because most poisoned children do not exhibit easily identifiable symptoms and virtually all children are at risk (CDC, 1991b). The Medicaid Guidelines called for all children under age 6 to be tested (CMS, 1998). In 1993, the American Academy of Pediatrics (AAP) also revised its policy to recommend the routine screening of virtually all young children under age 6 (AAP, 1993). Because lead risk varies considerably by geography, CDC in 1997 recommended that State and local health departments assess local data on lead risks and develop lead-screening recommendations for health care providers in their jurisdictions, focusing on 1- and 2-year old children (CDC, 1997). CDC updated its statement in 2005 (see the Executive Summary in Appendix 16), while the U.S. Preventive Services Task Force (convened by the CDC) found that screening in asymptomatic children has not been demonstrated to be effective in improving clinical outcomes (Risshitelli, 2006).

5. Updated CDC Recommendations

CDC recommends that sources of lead in children's environments be controlled or eliminated before children are poisoned, i.e. "primary prevention" (CDC, 2007; CDC, 2012a). CDC "emphasize[s] the importance of environmental assessments to identify and mitigate lead hazards before children demonstrate BLLs at or higher than the reference value" and has "adopt[ed] prevention strategies to reduce environmental lead exposures in soil, dust, paint, and water before children are exposed" through action by itself and others. Various counseling, monitoring, and community-wide prevention activities are recommended at various BLLs. Given that no safe blood lead level threshold in children has been identified, in 2012 CDC eliminated the use of a "blood lead level of concern" and redoubled its primary prevention efforts that remove lead before children are exposed. (CDC, 2012a) For further information, see Chapter 16.

B. Causes of Childhood Lead Poisoning

Today, children in the United States are lead poisoned primarily through ingestion of lead-containing dust by normal hand-to-mouth and toy-to-mouth activity. Because lead is ubiquitous in industrial societies, there are many sources and pathways of lead exposure.

1. Lead in Residential Paint

The foremost cause of childhood lead poisoning in the United States today is lead-based paint and the accompanying contaminated dust and soil found in older houses (CDC, 1991b; Rabinowitz, 1985b; Jacobs, 1994). As early as 1897, lead-based paint was identified as a cause of childhood lead poisoning (Turner, 1897; Reich, 1992; Markowitz, 2000; Warren, 2002; Bellinger, 2006). Many countries prohibited the use of lead in residential paints as far back as 1922 (Rabin, 1989). Lead was a major ingredient in most interior and exterior oil house paints before 1950, with some paints containing as much as 50 percent lead by dry weight (see *Figure 1.1*). In the early 1950s, other ingredients became more popular, but some lead pigments, corrosion inhibitors, and drying agents were still used. Lead was first regulated in residential paint in 1972 at 0.5 percent and "banned" in 1978, meaning that paint could contain no more than 0.06 percent (600 parts per million) lead by dry weight (Rabin, 1989; Reich, 1992). The Consumer Product Safety Improvement Act of 2008 (Public Law 110-314) reduced the threshold to 0.009 percent (90 parts per million) lead by dry weight (CPSC, 2008).

2. Lead-Based Paint in Housing

HUD estimates that 38 million housing units have lead-based paint (Jacobs, 2002). The likelihood, extent, and concentration of lead-based paint increase with the age of the building.

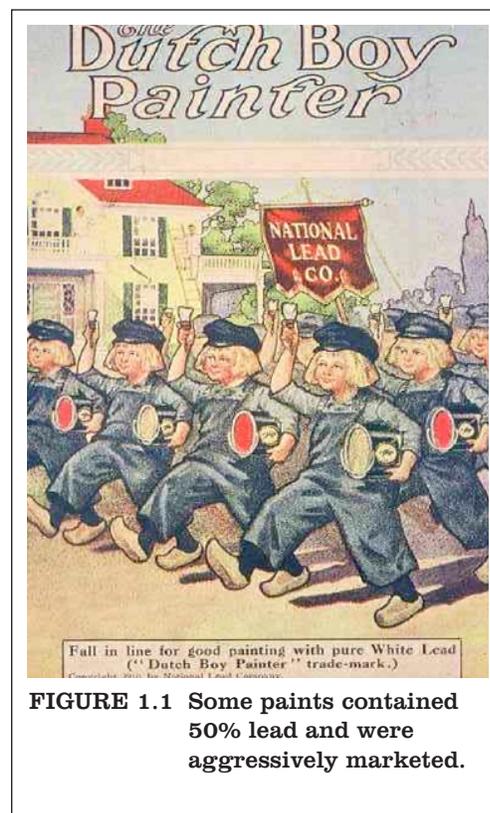


FIGURE 1.1 Some paints contained 50% lead and were aggressively marketed.



FIGURE 1.2 Deteriorated residential paint on house trim.



FIGURE 1.3 Paint deterioration.

Because the greatest risk of paint deterioration is in dwellings built before 1950, older housing generally commands a higher priority for lead hazard controls (see Figures 1.2 and 1.3). (See Chapter 5 for lead-based paint prevalence data by building component type and prevalence of housing with significant lead-based paint hazards by year of construction.)

3. Lead in Surface Dust

The belief that in order to be poisoned children must eat lead-based paint chips is unfounded. The most common cause of poisoning is the ingestion – through hand-to-mouth transmission – of lead-contaminated

surface dust (Clark, 1991; Bellinger, 1991; Roberts, 1991; Chisolm, 1985; Farfel and Chisolm, 1990; Farfel, 1994a; Lanphear, 1998). HUD estimates that 15.5 million housing units have levels of lead in interior dust that exceed EPA standards (Jacobs, 2002). Lead-contaminated dust may be so fine that it cannot be seen by the naked eye. In addition, lead-contaminated dust is difficult to clean up. Leaded-dust is generated as lead-based paint deteriorates over time, is damaged by moisture, abraded on friction and impact surfaces, or disturbed in the course of renovation, repair, or abatement projects. Lead can also be tracked into homes from exterior dust and soil. Since Congress also defined lead found in dust and soil to be lead-based paint hazards, these *Guidelines* address lead in surface dust and soil as well as in paint.

4. Lead in Soil

Children can also be exposed to lead in bare soil. HUD estimates that almost 5 million housing units have levels of lead in soil that exceed EPA standards (Jacobs, 2002). The high levels of lead in soil typically come from deteriorating exterior lead-based paint around the foundation of a house (Ter Harr, 1974; Linton, 1980). The fallout of lead emissions from the combustion of leaded-automobile gasoline, lead-based paint, and industrial sources also contributes to lead levels in soil (ATSDR, 1988). In some areas high leaded-soil levels result from factory and smelter emissions or deteriorating lead-based paint on steel structures, such as bridges. Bare soil that is contaminated with lead poses a hazard to children who play in it. Lead in soil may also be tracked into a home, increasing interior levels of dust lead. These *Guidelines* address lead-contaminated soil, as well as lead-based paint and lead-contaminated dust.

5. Other Causes of Lead Poisoning

Other sources and pathways of lead poisoning in children can include drinking water, point sources (such as smelters or industrial dischargers), ceramics, toys, children's jewelry, lead brought home from a parent's workplace, imported candy and its candy wrappers, home and folk remedies, cosmetics, and hobbies (such as casting lead sinkers or toy soldiers, making stained glass, loading ammunition, and soldering). These sources may account for some children's exposure; however, for most children, paint, dust, and soil are the primary sources of lead poisoning. For additional and more recent information, go to CPSC home page, <http://www.cpsc.gov/>, look on that home page for recent news and click on "CPSC Publications." You may then click on "Find Publications by Specific Topic" to search for Lead and/or for Lead-based paint. If you click on the Spanish header to the CPSC Publications page, you may search for "plomo" in "Publicaciones en Español." You may also visit the CDC Lead Poisoning Prevention Program home page: <http://www.cdc.gov/nceh/lead/>.

C. The Evolution of Prevention Approaches

The approach to identifying and responding to lead-based paint hazards and how they poison children in American housing has evolved over the past several decades.

1. Medical Treatment of Poisoned Children (Tertiary Treatment)

During the 1940s and 1950s, deaths from childhood lead poisoning were common. Using chelation therapy (the use of drugs to excrete lead from the body), medical providers attempted to treat symptomatic cases to prevent death, with the assumption that children who survived had been cured. During the 1950s, studies in Chicago (Williams, 1952), New York City (McLaughlin, 1956), and Baltimore (Chisolm, 1956) demonstrated conclusively that children who survived serious lead poisoning were often left mentally retarded or otherwise permanently impaired (Lin-Fu, 1982). More recent chelating agents are D-penicillamine and succimer (WebMD, 2010 at <http://emedicine.medscape.com/article/815399-treatment>). Chelation therapy should only be undertaken in consultation with a medical doctor with experience in the chelation of children for lead poisoning.

2. Screening and Case Management Programs (Secondary Prevention)

Recognition of these neurological problems gave rise to expanded screening and case management programs in many cities and states. Before the late 1980's, the traditional approach to childhood lead poisoning prevention was reactive, relying on the identification of a poisoned child to trigger investigation of lead hazards in the home environment. Based on the belief that children had to eat lead-based paint chips to be poisoned, the typical response to a lead poisoning during the 1970s and early 1980s consisted of removing deteriorated lead-based paint by scraping, uncontrolled sanding, or open flame burning. Approaches differed slightly, depending on the jurisdiction. Some jurisdictions required removal of all lead-based paint below a certain height, such as 5 feet; others required only that deteriorating paint be removed. However, these traditional abatements had one common characteristic: little attention was paid to controlling, containing, and cleaning up leaded-dust. In many cases these paint removal methods actually aggravated the problem and increased lead exposures,

poisoning workers and children in the process. Several studies found that uncontrolled abatement and inadequate cleanup caused increased blood-lead levels (Farfel and Chisolm, 1990; Rabinowitz, 1985a; Amitai, 1987).

3. Primary Prevention

As knowledge about lead poisoning increased, Congress concluded that responding to poisoned children was an ineffective solution to the nationwide problem. Legislation reflected a shift toward primary prevention. During the 1980s, HUD's requirements regarding treatment of lead-based paint were similarly amended. Department-wide regulatory revisions pertaining to lead-based paint in certain programs were made in 1986, 1987 and 1988. Housing and community development regulations began to include primary prevention strategies such as requiring inspections of pre-1978 public housing and abatement during substantial rehabilitation. HUD's 1990 *Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing (Interim Guidelines)*, which evolved from the 1987 Housing and Community Development Act, emphasized the danger of lead-contaminated dust and the need for worker protection and thorough cleanup. HUD's Office of Public and Indian Housing revised its program provisions in 1991, and made important changes in 1995 to the Housing Quality Standards (HQS), which apply to Section 8 tenant-based rental assistance and certain other HUD programs. When Title X was signed in 1992, primary prevention was included in the national strategy. The first edition of the final *Guidelines* was issued in 1995 and, as a documented methodology, has been incorporated by reference into many states' lead laws. The data demonstrating that no "safe" threshold for blood lead levels in young children has been identified highlights the importance of preventing childhood exposures to lead. It confirms the need for a systematic and society-wide effort to control or eliminate lead hazards in children's environments before they are exposed. In 2005, CDC specifically focused on primary prevention and published *Preventing Lead Poisoning in Young Children* (CDC, 2005).

III. The Title X Regulatory Framework

Title X fundamentally reorganized the national approach to controlling lead-based paint hazards in housing by focusing attention on lead hazards through the establishment of new requirements for property owners as well as Federal agencies and mandating action to improve the safety and effectiveness of lead-based paint activities.

A. Definition of "Lead-Based Paint Hazard"

Title X redefined the concept of "lead-based paint hazards." Under earlier Federal legislation (Housing and Community Development Act of 1987; Public Law 100-242), a lead-based paint hazard was defined as any paint containing 1 mg/cm² or more of lead regardless of its condition or location. Title X states that a lead-based paint hazard is "any condition that causes *exposure* to lead from lead-contaminated dust, lead-contaminated soil, or lead-contaminated paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects..." (emphasis added, 42 U.S.C. 4851b(15)). Thus, under this definition, intact lead-based paint on most walls and ceilings is not considered a "hazard," although the condition of the paint should be monitored and maintained to ensure that it does not deteriorate. While most efforts to reduce lead hazards in housing will now be aimed at controlling lead-based paint hazards as defined by Title X,

Federal law makes one notable exception: in public housing and Tribally-Designated Housing Entities, all lead-based paint must be abated when the housing is modernized.

B. Regulatory Framework for Lead Hazard Control

As directed by the Congress in Title X, HUD, EPA, OSHA, and CDC have issued the following regulations and guidelines with respect to the evaluation and control of lead-based paint hazards in housing (Refer to Appendix 6):

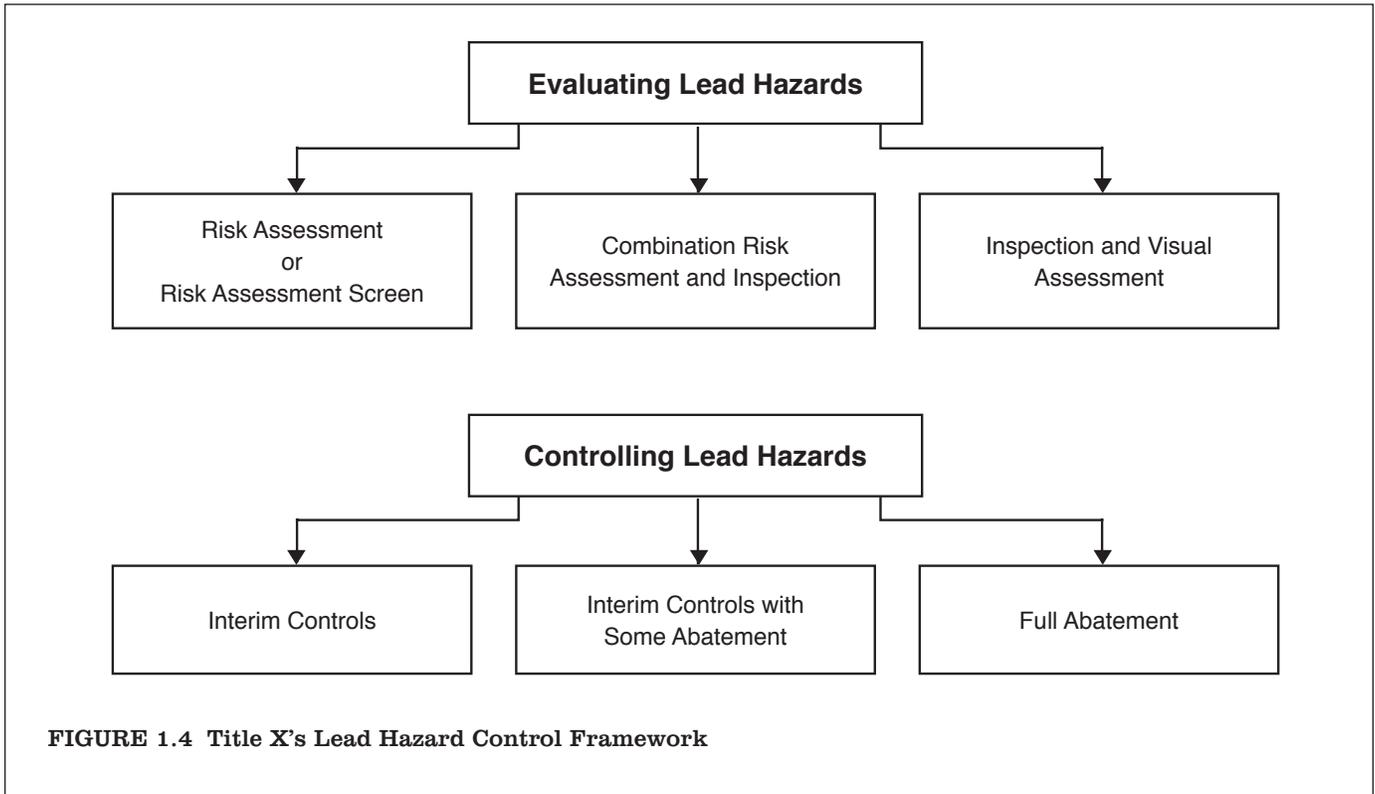
- ◆ HUD and EPA jointly: Requirements for Disclosure of Known Lead-Based Paint and/or Lead-Based Paint Hazards Upon Sale or Lease of Residential Property (HUD: 24 CFR Part 35, subpart A; EPA: 40 CFR Part 745, subpart F).
- ◆ HUD: Requirements for Notification, Evaluation and Reduction of Lead-Based Paint Hazards in Federally Owned Residential Property and Housing Receiving Federal Assistance, known as the HUD Lead Safe Housing Rule (24 CFR Part 35, subparts B-R).
- ◆ EPA: Requirements for Lead-Based Paint Activities in Target Housing and Child Occupied Facilities; Requirements for Hazard Education Before Renovation of Target Housing; Identification of Dangerous Levels of Lead; Renovation, Repair, and Painting. (40 CFR Part 745).
- ◆ OSHA: Interim Lead in Construction Standard (29 CFR 1926.62).
- ◆ CDC: CDC Response to Advisory Committee on Childhood Lead Poisoning Prevention Recommendations in "Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention." (CDC, 2012a). Preventing Lead Poisoning in Young Children (CDC, 2005); Managing Elevated Blood Lead Levels Among Young Children (CDC, 2002); and Screening Young Children for Lead poisoning: Guidance for State and Local Public Health Officials (CDC, 1997).

These regulations and guidelines constitute the Federal regulatory framework for the evaluation and control of lead-based paint hazards in housing, as of the publication of this second edition of the *Guidelines*. Future regulations, including revisions of existing regulations, are possible; the agencies' websites should be checked for regulatory updates.

There are three Federal government initiatives that may affect the way lead-based paint issues are defined and dealt with in the future. In January 2012, an advisory committee to the CDC recommended that CDC no longer use the term "level of concern", but use a childhood blood lead level reference value of 5 µg/dL, with possible future reductions (CDC ACCLPP, 2012); CDC considered the committee's recommendations in formulating its policies, which it published on May 16, 2012 (CDC, 2012a). CDC adopted the core recommendation of eliminating the term "level of concern" from its future policies, guidance documents, and other CDC publications, and it will use a childhood blood lead level (BLL) reference value based on the 97.5th percentile of the population BLL in children ages 1-5 (5 µg/dL as of the publication of this edition of these *Guidelines*) to identify children and environments associated with lead-exposure hazards. CDC also adopted the recommendation that the reference value should be updated by CDC every four years based on the most recent population based blood lead surveys among children. CDC's response to the other recommendations is provided in their full response. At the same time, CDC also issued Fact Sheet: Blood Lead Levels in Children – Important Information for Parents, providing parents and other concerned individuals with an update on this issue (CDC, 2012b). documents.

1. Evaluating Lead Hazards

The principal lead hazard evaluation methods are 1) risk assessment or lead hazard screen, 2) risk assessment combined with lead-based paint inspection, and 3) lead-based paint inspection combined with visual assessment (see *Figure 1.4*). Alternatives to evaluation include visual assessment and the presumption that lead-based paint and/or lead-based paint hazards are present.



“Risk assessment” is an onsite investigation of a residential building for lead-based paint hazards and includes, but may not be limited to: a visual inspection; targeted environmental sampling of dust, soil, and deteriorated paint; and a report of the results that identifies acceptable abatement and interim control strategies for controlling any identified lead-based paint hazards. Risk assessments and paint inspections can be combined to provide a more comprehensive evaluation of lead hazards (see Chapters 3, 5 and 7).

“Lead hazard screen” is a limited assessment of hazards performed in accordance with the methods and standards made by the state or EPA, as appropriate. A lead hazard screen may identify the need for a follow-up risk assessment.

“Paint inspection” is a surface-by-surface investigation of all painted surfaces – interior and exterior – in common areas of multi-family buildings, as well as in dwelling units. The inspection uses portable X-ray fluorescent (XRF) analyzers and/or laboratory analysis of paint samples to determine the presence of lead-based paint, and provides a report of the results. Inspections to identify the presence of lead-based paint should not be confused with clearance examinations, risk assessments, or investigations of homes with lead-poisoned children. Adding a visual assessment will identify the presence of deteriorated paint that is a hazard.

“Visual Assessment” alone is an alternative to evaluation. Under some circumstances, such as for dwelling units occupied by families with tenant-based rental assistance or as part of ongoing lead-based paint maintenance, property owners or housing quality inspectors may conduct a visual assessment to identify any deteriorated paint, unusual amounts of visible dust, or other conditions that suggest the possible existence of lead hazards. HUD does not consider a visual assessment by itself to constitute an “evaluation” because it does not include a scientific test for the presence of lead. Nevertheless, a visual assessment that is combined with a lead-based paint inspection can identify the presence of lead-based paint hazards.

“Presumption” is another alternative to evaluation. Property owners may presume that all painted surfaces are coated with lead-based paint and that all bare soil is hazardous, so long as they treat all surfaces to be disturbed as if they contain lead. Such a presumptive approach may be cost-effective in the case of pre-1960 housing in poor condition. Presumption is specifically included in the Lead Safe Housing Rule.

2. Controlling Lead Hazards

Title X provides for three types of lead hazard control: interim controls; abatement of lead-based paint hazards; and complete abatement of all lead-based paint (see Figure 1.4). Interim control and abatement activities are frequently combined in lead hazard control projects. Other construction activities, such as renovation and remodeling, rehabilitation, and weatherization, also may treat some or all lead hazards. These *Guidelines* recommend procedures that increase the safety and effectiveness of all types of construction projects that are carried out in housing that might contain lead-based paint, regardless of the intent.

The three types of lead hazard control are described as follows:

Interim controls, according to Title X, are “a set of measures designed to reduce temporarily human exposure or likely exposure to lead-based paint hazards, including specialized cleaning, repairs, maintenance, painting, temporary containment, ongoing monitoring of lead-based paint hazards or potential hazards, and the establishment and operation of management and resident education programs.” Interim controls include cleaning surfaces of dust, paint film stabilization and friction and impact surface treatments. Interim controls are appropriate for implementation on a broad scale. Research has found them to be cost-effective in many cases (NCHH, 2004). Whenever interim controls are employed, the property owner should undertake ongoing maintenance of lead-based paint, as some potential hazards may still be present and new hazards may be created. Interim controls are essentially renovation and repair items, and fall under the EPA’s RRP rule.

Abatement of lead-based paint hazards, according to Title X, is “a set of measures designed to permanently eliminate lead-based paint hazards....” Such measures include: “(A) the removal of lead-based paint and lead-contaminated dust, the permanent containment or encapsulation of lead-based paint, the replacement of lead painted surfaces or fixtures, and the removal or covering of lead-contaminated soil; and (B) all preparation, cleanup, disposal, and post-abatement clearance testing activities associated with such measures.” Title X redefined the term “abatement” to mean the elimination of “lead-based paint hazards” to last for a period of twenty years, not necessarily removal of all lead-based paint.

Full abatement of lead-based paint is where all lead-based paint has been abated and clearance has been achieved. When paint removal is the abatement method used, the property has achieved the status of “lead-based paint free.” This can exempt the property from the Lead Safe Housing Rule, although disclosure of knowledge is still necessary for sale of target housing. If hazards are abated by encapsulation or enclosure, lead-based paint on the property would remain, and the property would not be “lead-based paint free.”

C. Requirements To Ensure Quality Control

To ensure that lead hazard control work is carried out safely and effectively, Title X imposed a number of requirements for consistency and quality control.

1. Training and Certification

EPA requires that all risk assessors, lead-based paint inspectors, dust sampling technicians, abatement supervisors, abatement workers, and renovation supervisors (“certified renovators”), who receive compensation for their work in target housing or pre-1978 child-occupied facilities that is not exempt from the applicable regulations, meet minimum training requirements and be certified by EPA or by an EPA-authorized State or Tribal program (40 CFR §§ 745.227 or 745.324). Workers on federally assisted abatement, interim control, maintenance or rehabilitation projects in target housing must meet HUD-approved training requirements (24 CFR §§ 35.1325 or 35.1330); since the EPA’s Renovation, Repair, and Painting (RRP) Rule went into effect in 2010, HUD’s lead-safe work practices training requirement is satisfied by EPA’s renovation certification training requirement. Technicians who collect dust samples in connection with clearance examinations (sampling technicians) after renovation and rehabilitation (but not abatement) must meet EPA and, if applicable, HUD training requirements (40 CFR 745.90 and 24 CFR 35.1340). Training is generally not provided by EPA or HUD, but is provided by the private sector and some state, local, and tribal governments.

2. Accreditation of Training Providers

EPA requires that every training program delivering courses for lead certification for activities in target housing and pre-1978 child-occupied facilities be accredited by either EPA or an EPA-authorized State or Tribal certification program.

3. Health-Based Standards

EPA has identified standards for dangerous levels of lead in household dust, soil, and paint, as set forth in section IV.C of this chapter, for use in risk assessments and for clearance after completion of lead hazard control activities.

4. Performance Standards for Testing and Abatement Products

HUD and EPA have established criteria, testing protocols, and performance standards checklists for lead-based paint evaluation and hazard reduction products. The American Society for Testing and Materials has also developed a number of such standards. Those criteria, protocols, performance characteristics and standards are reflected in these *Guidelines*.

5. Laboratory Accreditation

Laboratories analyzing environmental samples of lead in paint film, dust, and soil must be recognized by EPA under the National Lead Laboratory Accreditation Program (NLLAP). A state-by-state list of NLLAP-recognized laboratories is provided on the Internet at <http://www.epa.gov/lead/pubs/nllaplist.pdf>.

D. State and Local Regulations

Many States and some local governments have issued regulations governing lead hazard evaluation and control. If there is a difference between Federal, State and local regulations, the more stringent applicable requirements must be observed in any given jurisdiction.

IV. Organization and Use of the Guidelines

Evaluation and control of lead-based paint hazards is an evolving field. For cases in which research has demonstrated that certain techniques are appropriate, references are cited. In some cases, laws or regulations specify how something is to be done; in other cases, no or an insufficient amount of research has been done to describe clearly the best approach to solving a specific problem. Recognizing that problems require answers, these *Guidelines* offer advice based on the experience and considered judgment of the authors and reviewers, and on the applicable laws and regulations. For cases in which citations are not provided, the reader should assume that the source of the advice is anecdotal and is the best advice that HUD can provide at this time.

A. Chapter Organization

A short summary of steps is provided at the beginning of each technical chapter to alert the reader to especially critical points and action steps. In general, the material is presented in each chapter in order of sequence in a typical project; however, a complete reading and understanding of these *Guidelines* is essential before any project is undertaken. Wherever possible, the *Guidelines* explain the rationale for recommendations and provide a technical description of the action to be taken.

1. Chapters 1-4: Background Information

Understanding the background material is critical to the successful completion of any project.

Chapter 1, *Introduction*, describes the purpose and application of the *Guidelines*; briefly reviews the hazards of lead-based paint in housing; summarizes major departures from past approaches; and provides context in terms of Federal law, regulations, and agency programs.

Chapter 2, *Where To Go for Help-Qualifications and Roles*, introduces the types of individuals involved in evaluating and controlling lead-based paint hazards in housing, explains their roles, and summarizes their qualifications.

Chapter 3, *Before You Begin the Project-Planning to Control Lead Hazards*, identifies the critical issues that must be examined to avoid problems and mistakes that can result in project delays and cost overruns.

Chapter 4, *Lead-Based Paint and Housing Renovation*, provides general advice on how to carry out work in older housing so that lead hazards are not inadvertently created (e.g., by disturbing lead-based paint) and how to combine renovation with abatement work.

2. Chapters 5-7: Hazard Evaluation and Ongoing Maintenance

Hazard evaluation helps ensure the selection of the safest and most cost-effective hazard control strategy for each situation.

Chapter 5, *Risk Assessment and Reevaluation*, provides detailed guidance on how risk assessments are to be conducted in various categories of housing, including protocols for environmental sample collection and interpretation, evaluation of building and paint condition, and methods for sampling a subset of units in multi-family buildings.

Chapter 6, *Ongoing Lead-Safe Maintenance*, provides detail on how to properly manage remaining lead-based painted components and soil with elevated levels of lead into the future while minimizing risk. This chapter incorporates much of the contents of Chapter 17, *Routine Building Maintenance and Lead-Based Paint*, of the first edition of these *Guidelines*.

Chapter 7, *Lead-Based Paint Inspection*, provides detailed information on methods for testing housing to determine the presence of lead-based paint on a surface-by-surface basis, including the use of portable XRF analyzers and paint-chip sampling for laboratory analysis.

3. Chapters 8-10: Preparation for the Project

The critical steps in preparing to control lead-based paint hazards are covered in Chapters 8-10.

Chapter 8, *Resident Protection and Worksite Preparation*, provides guidance on the steps needed to ensure that occupants are not endangered and that contamination is not spread.

Chapter 9, *Worker Protection*, provides detailed advice on how to comply with the OSHA Lead in Construction Standard while performing work in housing.

Chapter 10, *Housing Waste*, provides practical advice on methods for handling and disposing various kinds of debris to protect the environment.

4. Chapters 11-15: Hazard Control, Cleanup, and Clearance

Detailed information on how to carry out all aspects of lead hazard control is provided in Chapters 11-15.

Chapter 11, *Interim Controls*, provides specific guidance on interim controls: general principles of interim controls; dust removal; paint film stabilization; friction surface treatments; and soil and exterior dust treatments. The chapter also incorporates some of the contents of Chapter 17 of the first edition of these *Guidelines*.

Chapter 12, *Abatement*, covers general principles of abatement such as component replacement, enclosure, paint removal methods, and soil abatement.

Chapter 13, *Encapsulation*, describes how to use encapsulants.

Chapter 14, *Cleaning Following Hazard Controls or other Paint-Disturbing Work*, details cleanup procedures for lead hazard control projects.

Chapter 15, *Clearance*, explains how to conduct clearance tests after a lead hazard control project to ensure that a unit or area is safe for reoccupancy.

5. Chapters 16-18: Related Issues

Information on addressing lead-based paint hazards in special situations is provided in the final chapters of these *Guidelines*.

Chapter 16, *Investigation and Treatment of Dwellings that House Children with Elevated Blood Lead Levels*, describes the special measures that are usually taken by health departments, property owners and others to investigate and treat environmental lead hazards once a child has been identified as having an elevated blood lead level.

The substance of **Chapter 17, *Routine Building Maintenance and Lead-Based Paint***, was incorporated into the revised Chapters 6 and 11. Chapter 17 is now reserved for potential future use.

Chapter 18, *Historic Preservation*, discusses the special situations and issues surrounding lead-based paint in historic dwellings.

6. Glossary and Appendices

The definitions of key terms are consolidated in the glossary and deserve special attention because the meanings of several key terms, such as “abatement” and “renovation,” differ from common usage. The appendices provide detailed background information and technical materials.

B. Units of Measurement

- ◆ **mg/cm²** – milligrams per square centimeter, used for paint.
- ◆ **mg/L** – milligrams per liter, used for water.
- ◆ **percent** – percent by weight, primarily used for paint (1 percent = 10,000 µg/g).
- ◆ **ppb** – parts per billion by weight (1,000 ppb = 1 ppm); primarily used for water.
- ◆ **ppm** – parts per million by weight (10,000 ppm = 1 percent), equivalent to µg/g; primarily used for paint and soil.
- ◆ **µg/dL** – micrograms per deciliter, used for blood.
- ◆ **µg/ft²** – micrograms per square foot, used for settled dust.
- ◆ **µg/g** – micrograms per gram of sample, equivalent to ppm by weight; primarily used for paint and soil.
- ◆ **µg/m³** – micrograms per cubic meter, used for air.

C. Federal Lead Standards

If Federal standards differ from State, Tribal or local standards, the most stringent (protective) standards must be applied.

- ◆ Lead-based paint – 24 CFR 35.110 and 40 CFR 745.103
1 mg/cm² or 5,000 µg/g (5,000 ppm, equal to 0.5 percent).
- ◆ Paint containing lead applied between 1978 and August 13, 2009
0.06 percent (600 ppm) by weight.
- ◆ Paint containing lead applied on or after August 14, 2009 – 16 CFR 1303.2
0.009 percent (90 ppm) by weight.
- ◆ Dust lead hazard levels (by wipe sampling) – 40 CFR 745.65(b)
40 µg/ft² – floors (carpeted and uncarpeted).
250 µg/ft² – interior windowsills.
- ◆ Dust lead levels for lead hazard screen only (by wipe sampling) – 24 CFR 35.1320(b)(2)(i)
25 µg/ft² – floors.
125 µg/ft² – interior windowsills.
- ◆ Dust lead clearance levels (by wipe sampling) – 40 CFR 745.227(e)(8)(viii)
40 µg/ft² – floors (includes carpeted and uncarpeted interior floors).
250 µg/ft² – interior windowsills.
400 µg/ft² – window troughs (previously called “window wells” in some literature).
- ◆ Bare residential soil hazard levels – 40 CFR 745.65(c)
400 µg/g – play areas used by young children.
1,200 µg/g – building perimeter (dripline or foundation area) and yard other than play areas.
- ◆ Airborne lead particulate – Occupational Exposure Criteria
30 µg/m³ – OSHA action level (8-hour time-weighted average) – 29 CFR 1926.62(b)
50 µg/m³ – OSHA permissible exposure limit (8-hour time-weighted average) – 29 CFR 1926.62(c)(1)
- ◆ National Primary and Secondary Ambient Air Quality Standard for Lead – 40 CFR 50.16(a)
0.15 µg/m³ – arithmetic mean concentration averaged over a 3-month period.
- ◆ Lead action level for drinking water systems – 40 CFR 141.80(c)(1)
15 ppb (0.015 mg/L) – Exceeded if lead is above this concentration in over 10% of a drinking water system’s tap water samples.

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