U.S. Department of Housing and Urban Development
Washington, D.C. 20410

OFFICE OF LEAD-BASED PAINT ABATEMENT
AND POISONING PREVENTION

TO THE READER:

The U.S. Department of Housing and Urban Development (HUD) has issued these *Guidelines For the Evaluation and Control of Lead-Based Paint Hazards in Housing* pursuant to Title X of the Housing and Community Development Act of 1992. This document replaces the 1990 publication, *Lead-Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing*.

These new *Guidelines* are based on the most current scientific research. As ongoing studies are completed, HUD expects to issue revisions and updates that will incorporate advances in technology and more cost-effective methods validated by research and experience. For example, HUD and the U.S. Environmental Protection Agency are sponsoring a statistical study to determine whether reliable paint inspections of multifamily properties can be conducted with fewer units than are recommended in Chapter 7. It is planned that the results of that study and any modifications to Chapter 7 will be available in the fall of 1995. HUD is also preparing a more compact version of the Guidelines—a field guide—that is planned for publication in 1996.

Your comments and suggestions on ways to improve the *Guidelines* would be very helpful to the Department in preparing future revisions. Please send comments to: Director, Office of Lead-Based Paint Abatement and Poisoning Prevention, HUD—Room B–133, 451 Seventh Street SW., Washington, DC 20410.

Additional copies of the *Guidelines* are available for a small handling fee from HUD USER at 1–800–245–2691. Revisions and updates will be available from the same source.

U.S. Department of Housing and Urban Development

Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

June 1995

Acknowledgments

The U.S. Department of Housing and Urban Development and the National Center for Lead-Safe Housing wishes to thank the many individuals who helped prepare this document. Experts from the housing, public health, and environmental disciplines volunteered countless hours to provide the Nation with the best possible guidance. Due to their dedication and hard work, this document will further the effort to provide safe affordable housing and reduce childhood lead poisoning.

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TABLE OF CONTENTS

List of Tables

List of Tables (continued)

List of Figures

List of Figures (continued)

List of Figures (continued)

List of Figures (continued)

List of Figures (continued)

List of Figures (continued)

List of Forms

LIST OF APPENDIXES

Executive Summary

The *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, hereafter referred to as the *Guidelines*, provide detailed, comprehensive, technical information on how to identify lead-based paint hazards in housing and how to control such hazards safely and efficiently. The goal of this document is to help property owners, private contractors, and Government agencies sharply reduce children's exposure to lead without unnecessarily increasing the cost of housing.

The *Guidelines* address lead hazards posed by paint, dust, and soil in the residential environment. Lead exposures from air emissions, Superfund sites, drinking water, ceramics, home (folk) remedies, cosmetics, food, or other sources are not the focus of this manual.

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 by Congress in Title X.

Section 1017 requires the Secretary of the U.S. Department of Housing and Urban Development (HUD) to issue "guidelines for the conduct of *federally supported work* involving risk assessments, inspections, interim controls, and abatement of lead-based paint hazards" (emphasis added). Therefore, the primary purpose of this document is to provide guidance to people involved in identifying and controlling lead-based paint hazards in housing that is associated with the Federal Government. The *Guidelines* may also be useful to individuals in housing that has no connection with the Federal government, as well as day-care centers and public buildings that exhibit conditions similar to those in residential structures.

This document replaces *Lead-Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing*, which was issued by HUD in 1990. The *Guidelines* do not replace the *Lead-Based Paint Risk Assessment Protocol*, which applies only to the public and Indian housing program and was published in June 1992. The risk assessment procedures in the *Guidelines* are similar to those of the 1992 document, but the management systems of public and Indian housing authorities require slightly different risk assessment tools.

The *Guidelines* complement regulations, other directives, and other guidelines to be issued by HUD, the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor, and the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services. Other Federal agencies and State and local governments may also issue regulations and directives pertaining to housing under their jurisdictions. Regulations generally specify minimum requirements for *what* work must be done, *when* the work must be done, and what training and certification workers must have. Certain basic standards as to *how* the work must be done are also usually specified. The *Guidelines* provide more complete guidance than do regulations on *how* activities related to lead-based paint should be carried out and *why* certain measures are recommended. The *Guidelines* are not enforceable by law unless a Federal, State, or local statute or regulation requires adherence to certain parts of this document.

HUD prepared the *Guidelines* in close consultation with EPA, CDC, OSHA, and several other Federal agencies. Most of the writing was done by the National Center for Lead-Safe Housing, with the help of numerous experts and practitioners who served as writers and reviewers.

Readers should be aware that lead hazard control is a rapidly changing field in which new products, methods, procedures, and standards are introduced frequently. The *Guidelines* will therefore be updated periodically, as research and experience provide new information, as technology advances, and as Federal regulations are revised. HUD welcomes comments and suggestions on ways to improve these *Guidelines*. Please send written comments to:

Director, Office of Lead-Based Paint
Abatement and Poisoning Prevention
U.S. Department of Housing and
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I. Childhood Lead Poisoning

Childhood lead poisoning has been labeled by CDC as "the number one environmental health hazard facing American children." Current evidence shows that 8.9 percent of American children under age 6 have blood lead levels greater than 10 μg/dL, which is CDC's current threshold of concern (Brody, 1994; Perkle, 1994). Of greatest concern are changes in the brain that cause reductions in IQ and attention span, reading and learning disabilities, hyperactivity, and behavior problems. Adult workers who are exposed to lead also suffer a variety of health problems. Pregnant workers and their fetuses are at special risk.

Because lead has been successfully removed from gasoline and food, CDC believes the foremost source of lead in the environments of young children is house paint applied before the 1978 ban on lead-based paint for residential and consumer use. Closely associated sources of lead are lead-contaminated dust and soil.

II. The Title X Framework

The most difficult question in lead-based paint hazard control derives from resource limitations: How can the cost-effectiveness of lead hazard control be maximized so children's lead exposure in housing can be sharply reduced without unnecessarily adding to the cost of housing?

In confronting this problem, Congress provided in Title X a framework to allow governmental officials, property owners, participants in the real estate industry, and specialists in lead-based paint hazard control to tailor sensible and effective lead hazard control programs to fit the financial and environmental conditions of specific properties. In effect, the immediate goal is to make housing lead-safe rather than lead-free.

This framework, however, is not simple. With the flexibility needed for practicality and cost-effectiveness comes complexity. And with complexity comes the need to learn, share information, and continually improve methods.

III. Definition of "Lead-Based Paint Hazard"

Title X redefines the concept of "lead-based paint hazards." Under prior Federal legislation, a lead-based paint hazard was any paint containing 1 mg/cm^2 of lead or more, regardless of paint condition or location. Title X states that a lead-based paint hazard is "any condition that causes *exposure* to lead . . . that would result in adverse human health effects" and that comes from:

- Lead-contaminated dust.
- Bare, lead-contaminated soil.
- Lead-contaminated paint that is deteriorated or present on accessible, friction, or impact surfaces.

Thus, under this definition, intact lead-based paint on most walls and ceilings would not be considered a "hazard," although the paint should be maintained and its condition monitored to ensure that it does not deteriorate and become a hazard.

Title X acknowledges that some lead-based paint hazards are of more immediate concern than others. In these *Guidelines*, the hazards

considered to be of greatest immediate concern are those to which children are most frequently exposed: lead-contaminated dust; deteriorated lead-based paint; and lead-contaminated soil if it is bare, accessible to young children, and/or likely to be blown or tracked into the dwelling. Also of concern are friction, chewable, and impact surfaces with intact lead-based paint. Friction surfaces are subject to abrasion and may generate lead-contaminated dust in the dwelling; chewable surfaces are protruding surfaces that are easily chewed on by young children; and impact surfaces may become deteriorated through forceful contact. Intact lead-based paint on flat surfaces not subject to abrasion, impact, or other disturbances, although of less concern, is still a potential hazard because the paint could deteriorate over time, as a result of age, disturbance (through renovation and repair), or major casualty (such as fire, storms, and water leaks).

Although most efforts to reduce lead hazards in housing will now be aimed at controlling lead-based paint hazards as defined by Title X, there is one notable exception: in public and Indian housing, all lead-based paint must be abated when the housing is renovated or remodeled.

Lead-based paint is any paint, varnish, stain, or other applied coating that has 1 mg/cm^2 (or 5,000 µg/g by dry weight) or more of lead. For the purposes of these *Guidelines*, the terms "leaded paint" and "lead-containing paint" are synonymous with "lead-based paint."

IV. Lead Hazard Control Process

The process of controlling lead hazards begins with suggestions on how property owners can tailor lead poisoning prevention efforts to their own unique dwellings.

A. Planning

In buildings constructed after 1978, it is very unlikely that lead-based paint hazards are present. No further action is recommended, unless a child with an elevated blood lead level is identified. The older the dwelling, the more prevalent and concentrated the lead-based paint. The prevalence of lead-based paint in housing built before 1940 is especially high; after 1940 the use of lead in paint declined steadily. The condition of the building (i.e., its paint and substrates coated with that paint), its projected service life, and funding availability also bear directly on the owner's decision about a specific course of action.

B. Lead Hazard Evaluation

Most lead hazard control efforts begin with an evaluation of the nature and extent of the problem. Evaluations of lead hazards should be conducted through risk assessments, paint inspections, or a combination risk assessment/paint inspection. A risk assessment is an onsite investigation of a residential building to determine the location, severity, and nature of lead-based paint hazards and includes (but may not be limited to) a visual inspection to determine the condition of painted surfaces, the need for structural repairs, and locations for dust, soil, and paint sampling; limited environmental sampling of dust, soil, and deteriorated paint; and a report of the results that identifies acceptable abatement or interim control strategies for controlling any lead-based paint hazards. Risk assessments and inspections can be combined (see Chapters 3 and 5). A paint inspection "means a surface-by-surface investigation of all painted surfaces—interior and exterior, in common areas of multifamily buildings as well as in dwelling units—using portable x-ray fluorescence paint analyzers or laboratory analysis of paint samples to determine the presence of lead-based paint, and the provision of a report on 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. These *Guidelines* also describe a lead hazard screen risk assessment for dwellings in good condition that are unlikely to contain lead hazards (see Chapter 5). This flexibility reduces the cost of evaluating lead hazards.

Paint inspections are particularly useful in developing plans to conduct abatement during renovation or remodeling activities, while risk assessments are often used to confirm that no lead hazards exist or to guide interim control efforts if hazards are identified. Combining these approaches has the advantage of identifying both immediate and potential hazards so owners can understand what work must be done immediately and what work can be done at later, more convenient times (for example, vacancy and rehabilitation).

The *Guidelines* provide detailed procedures and forms for completing both risk assessments and inspections. Slightly different procedures are recommended for owner-occupants and owners of large and small rental properties.

If an owner decides to bypass the evaluation process and correct suspected lead hazards, a clearance process is needed to ensure that all lead-based paint hazards were actually corrected and that leaded dust and soil levels remaining at the conclusion of the project are acceptable. Some jurisdictions, HUD regulations, or EPA regulations may require risk assessments, inspections, and/or clearance examinations. Successful completion of the process may require a certificate documenting the status of the dwelling.

C. Lead Hazard Control

In the Title X framework, there are three types of lead hazard control: interim controls, abatement of lead-based paint hazards, and complete abatement of all lead-based paint. Interim controls are designed to address hazards quickly, inexpensively, and temporarily, while abatement is intended to produce a permanent solution. In the *Guidelines*, "permanent" means having an expected life of at least 20 years.

Interim controls, according to Title X, "means a set of measures designed to reduce temporarily human exposure or likely exposure to lead-based paint hazards, including specialized cleaning" (to reduce lead-contaminated dust), "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 dust removal, paint film stabilization, and treatment of friction and impact surfaces. Interim controls are appropriate for implementation on a broad scale and may prove cost effective in many cases. Whenever interim controls are employed, ongoing monitoring of lead hazards must be undertaken by the property owner because lead-based paint may still be present and may become hazardous in the future.

Abatement of lead-based paint hazards, according to Title X, "means any set of measures designed to permanently eliminate lead-based paint hazards . . ." Such measures may 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." Consistent with its focus on lead-based paint hazards, Title X has redefined the term "abatement" to mean the elimination of "lead-based paint hazards," not necessarily all lead-based paint.

Complete abatement of lead-based paint means the permanent elimination of all lead-based paint, interior or exterior, intact or not intact, using the same methods as those included in the definition of abatement of lead-based paint hazards. Title X requires this for public and Indian housing (leaving unchanged the statutory requirements that have been in place since 1987). Specifically, all pre-1978 public and Indian housing must be inspected, and all lead-based paint identified must be abated (not just lead-based paint hazards). While there is no explicit deadline, abatement in public and Indian housing usually occurs during rehabilitation.

The *Guidelines* take a performance-oriented approach to lead hazard control work. Any construction material or method that meets the performance criteria for interim control or

abatement work is acceptable as long as residents and workers are protected, clearance standards are met, the methods used are not expressly prohibited, waste is properly managed, and the effectiveness of the measure is evaluated over time. This permits innovation and should reduce costs.

All interim controls and some abatement methods require ongoing monitoring by owners and residents as well as periodic reevaluation by a certified professional.

As with risk assessment and inspection, a combination of approaches is often best to address lead-based paint in the most cost-effective way in a particular dwelling. For example, it may make sense to stabilize the paint on trim (an interim control), while replacing windows in the same dwelling (an abatement measure). The owner may decide to replace only parts of the windows, such as the sashes and/or interior window sills (sometimes known as stools). Since each case is different, owners are encouraged to seek professional guidance from certified risk assessors and certified abatement supervisors to determine which strategy is best. Risk assessments can target lead hazards and make controls more cost-effective.

Whenever building components such as doors and windows are replaced, the *Guidelines* recommend that they be replaced with products that are more energy efficient. This will help reduce energy consumption and also reduce the length of time it takes for new components to pay for themselves.

1. Encapsulation

Encapsulants include coatings and rigid coverings that are bonded to the existing paint film with an adhesive (they are not mechanically fastened). Because encapsulants rely on adhesion to the existing paint film, their durability depends on the properties of the existing substrate coating. The standards indicated in Title X (Section 1051) defining encapsulant performance have not yet been promulgated. Encapsulants should not be confused with permanent enclosure systems, which are mechanically fastened to the structural system (and not dependent on the substrate coating for their durability) and can be expected to last at least 20 years.

2. Prohibited Methods

Some paint removal methods are known to be extremely dangerous in the residential setting and are prohibited. Prohibited methods include open-flame burning or torching, machine sanding or grinding without a high-efficiency particulate air (HEPA) vacuum exhaust tool, uncontained hydroblasting or high-pressure washing, abrasive blasting or sandblasting without HEPA vacuum exhaust tools, and heat guns that operate above 1,100°F. In addition, HUD does not recommend the on-site use of methylene chloride chemical strippers or dry scraping (except for limited areas). Safer alternative measures that make all these techniques unnecessary are available.

D. Preparation

Before control measures can actually be implemented, a few other planning steps are necessary. The *Guidelines* specifically recommend how to prepare worksites to protect residents. Under certain circumstances, occupants can remain inside the dwelling during the work (although they are never to be permitted within the work area itself while work is under way). A written compliance plan needs to be developed by the lead hazard control contractor/supervisor to comply with the worker protection requirements of the OSHA Lead in Construction Standard.

All abatement workers need to be properly trained by an accredited training provider. Untrained workers can worsen conditions. EPA has developed a training curriculum designed to teach workers to conduct their trade in a lead-safe manner.

The waste that will be generated from the project may also need to be tested and evaluated to determine whether it is hazardous. Both worker protection and hazardous waste requirements are strictly enforced.

E. Cleaning and Clearance

After the work has been completed, thorough cleaning is needed. For dust removal alone, all horizontal surfaces should be vacuumed with a HEPA vacuum and then washed with a lead-specific cleaning agent, trisodium phosphate detergent, or other suitable cleaner. For more involved abatement work, cleaning should be done by HEPA vacuuming all horizontal and vertical surfaces, wet washing, and a final HEPA vacuuming. Work should proceed from clean to dirty areas to prevent recontamination. After cleaning, clearance examinations should always be conducted by certified risk assessors or certified inspector technicians. The clearance examination involves a confirmation that the work was completed, a visual assessment for visible dust, and dust (and perhaps soil) sampling. HUD and EPA have established specific leaded dust standards for clearance purposes. If an owner chooses to bypass the evaluation (going straight to hazard control), a certified risk assessor should perform the clearance examination to ensure that all hazards were addressed and that remaining levels of leaded dust are acceptable.

F. Reevaluation

Some dwellings and control measures will require periodic reevaluations by a certified risk assessor to ensure that hazards have not reappeared. The *Guidelines* provide specific recommended schedules defining the frequency of reevaluations.

V. Other Issues

The *Guidelines* also include information on the special procedures for investigating a lead-poisoned child. This type of investigation is very different from the risk assessment or inspection process described earlier, which are related to the condition of a dwelling rather than the health of an individual child. Investigations of lead-poisoned children should involve close collaboration with the local health department, which may have primary authority over housing conditions and may require sampling for many more sources of lead than would be carried out in a routine risk assessment or paint inspection. Further guidance on this issue will be provided by CDC.

Finally, the *Guidelines* interpret historic preservation requirements and suggest safe procedures for maintenance activities that may disturb surfaces containing lead-based paint.

VI. Innovation and Cost-Effectiveness

Considerable research and innovation is under way. Future editions of these *Guidelines* will incorporate the results of these efforts. The *Guidelines* are a report on state-of-the-art procedures for all aspects of lead-based paint hazard evaluation and control.

Within certain regulatory limits and program funding requirements, the *Guidelines* are a performance-oriented document. At the most basic level, owners can conduct lead hazard control work any way they choose, as long as they protect workers and occupants, comply with clearance standards, monitor over time the effectiveness of the control measures implemented, and do not use prohibited methods. In short, these *Guidelines* describe the best known ways to perform lead hazard control work. The *Guidelines* also permit the flexibility needed to address different kinds of housing and identify specific cost-saving measures to make primary prevention of lead poisoning a reality in millions of homes across the country.