Designation: E 2115 – 00

Standard Guide for Conducting Lead Hazard Assessments of Residential Housing and Other Properties Frequented by Children[1]

This standard is issued under the fixed designation E 2115; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide describes how to conduct, document and report findings of a lead hazard assessment in residential dwellings and other buildings and related areas known to contain, or are suspected to contain, lead hazards. Lead hazard assessments are intended to be conducted by certified risk assessors. This guide is applicable for use in either occupied or unoccupied properties. The use of this guide to produce accurate results is dependent on the training, experience, and knowledge of the risk assessor conducting the lead hazard assessment. Use of the procedures in this guide, when supplemented by the evaluation and recommendation process that determines action plans for controlling assessed lead hazards, provides for the conduct of a lead risk assessment (see Note 1).

NOTE 1—A lead risk assessment, as defined by Federal regulation (40CFR745.227(d)), includes, as part of the reporting process, a description of interim controls and abatement options for each identified lead hazard and a suggested prioritization for addressing each hazard. This guide provides for the identification of lead hazards and the prioritization for addressing each hazard guidance on the determination of appropriate interim controls and abatement options for each identified lead hazard is beyond the scope of this guide and is included in a companion standard. Guidance on the determination of appropriate interim controls and abatement options for each identified lead hazard is beyond the scope of this guide and is the subject of a standard under development by E06.23.

1.2 This guide is insufficient as the sole means to determine causes of lead poisoning in young children having an elevated blood lead level (EBL). In these cases, procedures including investigation of the total living environment of the child and a pediatric medical evaluation is needed. Reference should be made to *Preventing Childhood Lead Poisoning* (CDC, 1991), the *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (HUD, 1997), and *Screening Young Children for Lead Poisoning* (CDC, 1997).

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.5 This guide contains notes, which are explanatory, and are not part of the mandatory requirements of this guide.

2. Referenced Documents

2.1 Wherever the requirements of a reference document or applicable regulation differ from the requirements presented in this guide the more stringent of the two shall be used.

2.2 *ASTM Standards:*

E 1583 Practice for Evaluating Laboratories Engaged in the Determination of Lead in Paint, Dust, Airborne Particulate, and Soil in and Around Buildings and Related Structures[2]

E 1605 Terminology Relating to Abatement of Hazards from Lead-Based Paint in Buildings and Related Structures[3]

E 1613 Test Method for Analysis of Digested Samples for Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP/AES), Flame Atomic Absorption (FAAS), or Graphite Furnace Atomic Absorption (GFAAS) Techniques[3]

E 1644 Practice for Hot Plate Digestion of Dust Wipe Samples for the Determination of Lead by Atomic Spectrometry[3]

E 1645 Practice for Preparation of Dried Paint Samples for Subsequent Lead Analysis by Atomic Spectrometry[3]

E 1726 Practice for The Sample Digestion of Soils for the Determination of Lead by Atomic Spectrometry[3]

E 1727 Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques[3]

E 1728 Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques[3]

E 1729 Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques[3]

E 1792 Specification for Wipe Sampling Materials for Lead in Surface Dust[3]

[1] This guide is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.23 on Abatement of Hazards from Lead in Buildings and Related Structures.

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[2] Discontinued. See *1997 Annual Book of ASTM Standards*, Vol .

[3] *Annual Book of ASTM Standards*, Vol 04.11.

E 1864 Practice for Evaluating Quality Systems of Organizations Engaged in Conducting Facility and Hazard Assessments to Determine the Presence and Extent of Lead in Paint, Dust, Airborne Particulate, and Soil in Buildings and Related Structures[3]

E 1973 Practice for Collection of Surface Dust by Air Sampling Pump Vacuum Technique for Subsequent Lead Determination[3]

E 1979 Practice for Ultrasonic Extraction of Paint, Dust, Soil, and Air Samples for Subsequent Determination of Lead[3]

E 2051 Practice for Determination of Lead in Paint, Settled Dust, Soil, and Air Particulate by Field-Portable Electroanalysis[4]

E 2119 Practice for Quality Systems for Conducting In Situ Measurements of Lead Content in Paint or Other Coatings Using Field-Portable X-Ray Fluorescence (XRF) Devices[3]

2.3 *CDC Document:*

CDC *Preventing Lead Poisoning in Young Children*, Centers for Disease Control and Prevention Atlanta, CDC October, 1991.

CDC *Screening Young Children for Lead Poisoning*, Centers for Disease Control and Prevention Atlanta CDC, 1997.

2.4 *HUD Document:*

HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing,"*

2.5 *EPA Documents:*

EPA *Risk Assessment Guidance*, Federal Register, Vol 60, 47248, September 11, 1995.

EPA *Lead-Based Paint* Poisoning Prevention in Certain Residential Structures 40 CFR Part 745.

3. Terminology

3.1 *Definitions:*

3.1.1 For definition of terms used in this guide see Terminology E 1605.

3.1.2 *assessed unit*, *n*—a dwelling or property that has been the subject of the investigation.

3.1.3 *lead activity summary*, *n*—a document that summarizes lead evaluation data and management activities on a specific structure or property presented in a single page format.

3.1.3.1 *Discussion*—This practice will provide a means of communicating summarized results of lead evaluation and management activities to occupants and others of a residential dwelling.

3.1.4 *lead hazard assessment*, *n*—an investigation of an assessed unit conducted to determine and report the location, type, severity of lead hazards which are accessible to children.

4. Summary of Guide

4.1 This guide provides procedures for gathering information, conducting a lead hazard assessment, and documenting and reporting the findings of the lead hazard assessment.

4.2 This guide discusses the conduct of a lead hazard assessment, in a stepwise progression, using a systematic application of the three general tasks listed below. Simultaneous conduct of several activities within these tasks generally is performed using a looping feedback structure shown in Fig. 1.

4.2.1 *Task 1*—Pre-site visit activities developing work specifications.

4.2.2 *Task 2*—On-site activities conducting field work.

4.2.3 *Task 3*—Post-site visit activities data reporting.

5. Significance and Use

5.1 This guide is intended to help prevent lead poisoning of children by providing standardized procedures to be used by a lead risk assessor when gathering and reporting findings and information needed to develop and recommend lead hazard control options (see Note 2).

NOTE 2—Development of lead hazard control recommendations for identified lead hazards, which is an important part of a risk assessment, is outside the scope of this guide and is contained in a separate document.

5.2 This guide is intended to be followed in accordance with all applicable local, state, and federal regulations.

5.3 A lead hazard is conducted as part of a lead risk assessment to determine and report the location, type, and severity of lead hazards in buildings and associated property surroundings that are accessible to children. The local risk assessment uses the findings from a lead hazard assessment in developing a report providing appropriate, cost effective lead hazard control recommendation options to the client (see Note 1).

5.4 This guide does not include the formal investigation of personal items that may contribute to lead hazards, such as toys, dishes, hobby materials, etc.; however, the risk assessor should report such hazards if they are identified during the conduct of a lead hazard assessment.

5.5 Lead hazard assessment findings only represent the condition of the property at the time the assessment is performed. Lead hazards identified during a lead hazard assessment often are related to the condition of the property. The presence of lead hazards can change over time as a result of property improvement or deterioration, significant changes in property use, and other factors.

5.6 Lead risk assessors must be certified for the conduct of lead-based paint activities under the appropriate state or federal program (see 2.6).

5.7 In addition to direct use by a lead risk assessor, this guide is applicable for assisting professionals, homeowners, owners or occupants of rental property, lenders, insurers and others with a property interest in determining the presence of lead hazards (see Note 3). This guide also is applicable for assisting designers of lead hazard mitigation projects to target their resources toward lead hazard controls most likely to result in the prevention of lead poisoning in young children.

NOTE 3—Whenever lead is present in a building in any form, the term "lead-free" should never be used to describe the absence of lead hazards because testing methodologies are not designed to measure freedom from any level of lead. Small amounts of lead present in substrates or on coatings below an applicable Federal, state, or local action level may become a hazard if the components are subjected to conditions or activities that create lead containing dust. Changes in property conditions and changes in children's habits related to the frequency of hand-to-mouth

[4] Discontinued 1999; Replaced by E 2051.

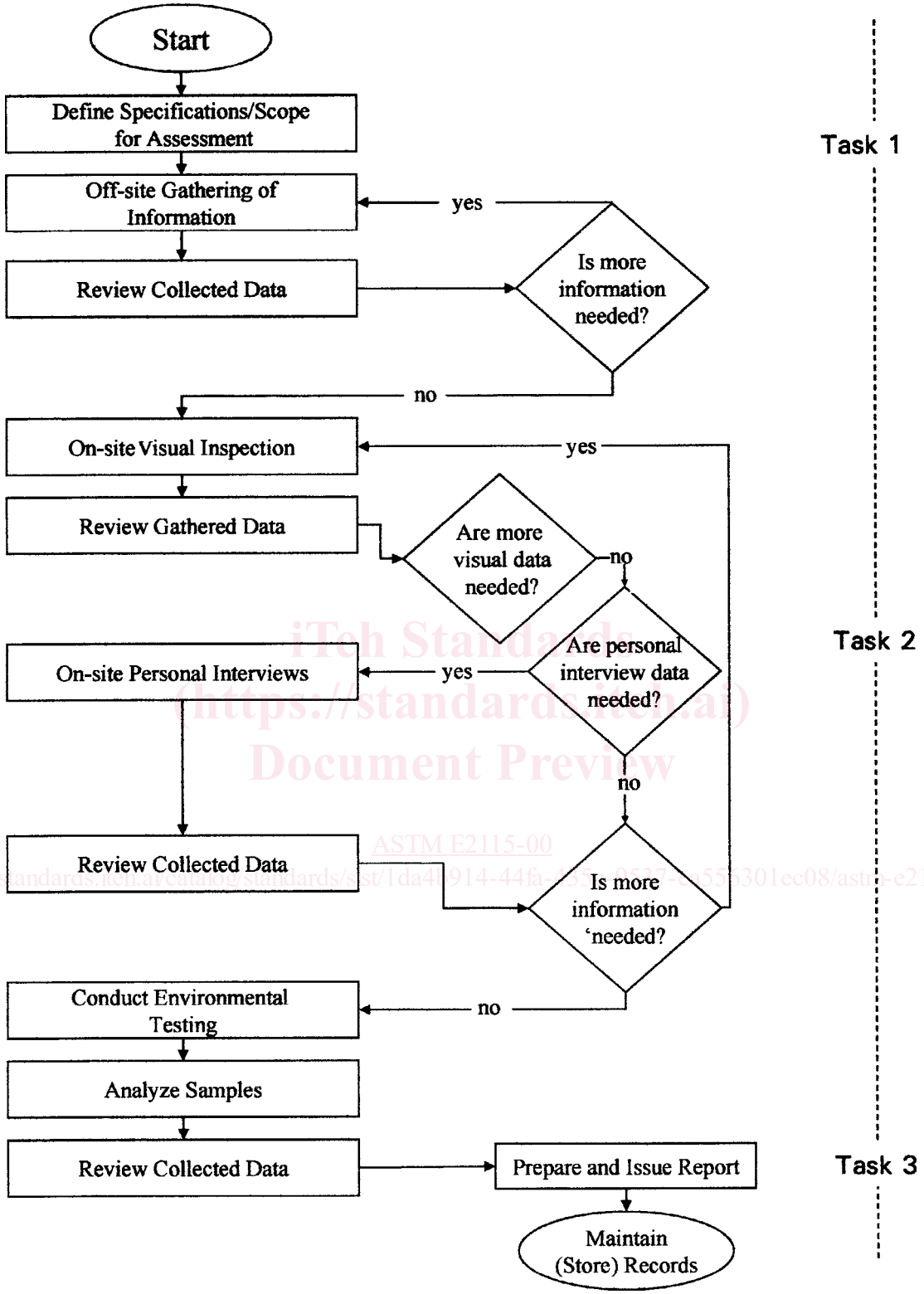

FIG. 1 Example Work Flow for Conducting a Lead Hazard Assessment

activity, which vary over time, further contribute to this inability to provide absolute assurance that a child will not become lead poisoned in the future.

5.8 The tasks and procedures outlined in this guide are based on developing technologies; therefore, this guide shall be reviewed periodically and amended to incorporate new information to ensure its continuing suitability in minimizing lead poisoning of children.

6. Experience Requirements for a Risk Assessor

6.1 Lead hazard assessments shall be carried out by qualified risk assessors as required through certification or licensing under appropriate federal, state, or local regulations.

7. Conducting a Lead Hazard Assessment

7.1 Lead hazard assessments are conducted using a systematic approach consisting of a series of activities within three general tasks. Although several of the activities within a task may be conducted simultaneously, they are discussed in a stepwise progression under each task labeled *(A)* through *(K)*.

Task 1—Pre-site Visit Activities: Developing Work Specifications:
- (*A*) Create a specifications document and define scope.
- (*B*) Gather information and review procedures.
- (*C*) Review collected data.

Task 2—On-Site Visit Activities: Conducting Field Work:
- (*D*) Conduct visual inspection.
- (*E*) Review collected data.
- (*F*) Conduct personal interviews.
- (*G*) Review collected data.
- (*H*) Conduct environmental testing.

Task 3—Post-Site Visit Activities: Data Reporting:
- (*I*) Analyze collected samples
- (*J*) Review collected data
- (*K*) Prepare and issue a lead hazard findings report (see Note 4).

NOTE 4—A complete risk assessment report to a client also should contain identification of acceptable abatement and control strategies for controlling any identified lead hazards. Guidance on how to provide this information is not part of this guide.

7.2 *Task 1—Pre-site Visit Activities: Developing Work Specifications*—The first task is to develop work specifications by which the investigation is conducted as listed in *(A)* through *(C)* as follows:

7.2.1 *(A) Create a Specifications Document and Define Scope*—For most lead hazard assessments performed for compensation, this guide serves to define the scope of work for use in a contract between the risk assessor and the client (see Note 5). Otherwise, its serves to define the scope of work for use in a project plan, for example, for staff work assignments. This guide, at a minimum, shall include the following items:

NOTE 5—In most cases, this guide will be generated from boilerplate materials that are modified as needed to fit the conditions and requirements of the specific site being assessed, as agreed upon by the client and assessor. This guide may or may not include approvals by the client or contingencies regarding the successful receipt of signed releases for information gathering from the client and occupants.

7.2.1.1 *Scope*—This is a description of the work to be performed as described in this guide. It includes a description of the minimum numbers and types of environmental tests to be performed during the assessment.

7.2.1.2 *Cost*—If the lead hazard assessment is performed for compensation, the cost for conducting the work shall be identified.

7.2.1.3 *Personnel Qualifications*—Qualifications of all personnel to be involved in the lead hazard assessment shall be identified. At a minimum, a summary of the relevant certifications, licenses, training, and experience for persons participating in the conduct of the lead hazard assessment shall be identified. This may be done generically and specific individuals need not be named.

7.2.1.4 *Regulatory Requirements*—A summary of the regulatory requirements for the area and structures being assessed including identification of the regulatory agencies having jurisdiction over the assessment activity, or subsequent hazard mitigation, or both, shall be included. Specific assessment requirements imposed by these regulatory agencies shall be identified and performed. Current regulatory levels of concern shall be specified.

7.2.1.5 *Laboratory Qualifications*—Qualifications for all laboratories to be involved in the assessment shall be identified. Laboratories selected for use shall hold all accrediations, certifications, and recognitions needed to conduct lead testing services as governed by regulatory agencies having jurisdiction over such work. At a minimum, the selected laboratory shall be recognized by the U.S. Environmental Protection Agency (EPA) National Lead Laboratory Accrediation Program (NLLAP).

7.2.2 *(B) Gather Information and Review Procedures*—Prior to traveling to the site where the lead hazard assessment is to be conducted, a number of activities shall be performed to plan for the on-site visit of the property. These activities include the following:

7.2.2.1 Acquire whatever signed permission releases are needed to enter the property to conduct the lead hazard assessment (see Note 6).

NOTE 6—Permission releases may include any of the following items:

Permission to enter the property;

Permission to acquire and review available property construction records, inspection records, previous lead hazard assessment or risk assessment records, and any other records appropriate to the conduct of the lead hazard assessment;

Permission to conduct dust sampling, soil sampling, in situ paint testing, water sampling, and any intrusive paint chip sampling deemed necessary or appropriate; and,

Permission to conduct interviews of the client and their personnel, as appropriate, and of occupants.

7.2.2.2 Acquire background information as appropriate from the client, their personnel, or the occupants. If they are available, specific background items shall include, but not be limited to, the following:

(a) Property construction or structural records including construction date;

(b) Existing floor plans;

(c) Past property usage records;

(d) Home inspection records;

(e) Any appropriate existing environmental testing records such as a lead hazard or risk assessment, lead-based paint inspection, or other lead or lead hazard testing;

(f) A statement as to the current general use of the structure;

(g) The number of occupants, and the demographics of the occupants; and,

(h) Any exposure related records from the occupants of the structure.

7.2.2.3 *Assemble a Property Profile*—Using the information acquired from 1 and 2 above, assemble profile of the property including information on all the items presented in Table 1.

7.2.2.4 *Assemble Testing and Sampling Materials*—Assemble, inventory, and pack for shipment to the assessment site relevant testing, sampling materials, and protocols required to determine the presence of lead that may be needed during a lead hazard assessment.

7.2.3 *Review Collected Data*—All data gathered from *(B)* (7.2.2) shall be reviewed, evaluated, and summarized into an internal summary report by the risk assessor prior to visiting the site. This summary report is for use by the risk assessor to direct efforts during the on-site visit. Permission related releases shall be grouped together and attached to the summary report for quick reference. At a minimum, the body of this summary report shall consist of a list of physical locations or location areas targeted for detailed examination (identify high priority locations for inspection) during the visual inspection of the property. The background information and property profile data acquired during Task 1 shall be used to construct this listing. This listing also shall include relevant informational notes for each of the targeted locations.

7.3 *Task 2—On-site Visit Activities: Conducting Field Work*—This task is listed in *(D)* through *(H)* listed as follows:

7.3.1 *(D) Conduct Visual Inspection*—The visual inspection is conducted to identify those locations that may pose a lead hazard. The visual inspection procedure begins with a general inspection of the assessed unit. The objective of the general inspection is to familiarize the risk assessor with the assessed unit, develop, acquire, or update a floor plan of the assessed unit, and reevaluate previously collected information such as that acquired during the pre-site visit assessment.

7.3.1.1 *Familiarize the Risk Assessor with the Unit to be Assessed*—Review the internal summary report *(C)* just prior to conducting a quick walk-through of the assessed unit. Use this review as a reminder to ensure the areas where the lead hazards are most likely to be present are included in the visual inspection.

7.3.1.2 *Prepare a Floor Plan of the Unit to be Assessed*—Acquire an existing floor plan or create a floor plan of the unit to be assessed. A floor plan should clearly indicate the major architectural features, such as windows, doors, and closets and compass orientation. Revise and update the floor plan as needed to create a final working floor plan for use in recording the presence of potential lead hazards and test/sample locations (see Note 7).

TABLE 1 Items to be Included in a Property Profile

Name and address of client, and relationship to property (owner, buyer, tenant, lender, insurer, etc.)
Address of property assessed
Description of the property assessed (home, apartment, commercial structure, etc.)
Age of property
Past, current, or planned renovations or repainting
Existing lead testing, or inspection reports or previous lead hazard assessment reports, or a combination thereof
Incidents of lead poisoning in the property
Repair or maintenance work orders of activity recently carried out
All other information on sources of lead in the property, its concentration or condition

NOTE 7—Recording of field data can be performed in a variety of ways including, but not limited to marking up of the floor plan, use of pre-printed forms, bound field notebooks, or video or audio recording devices, or a combination thereof.

7.3.1.3 *Identify, Categorize and Record All Items That Have the Potential to be a Lead Hazard*—Using the initial internal summary report *(C)* as a guide and the final working floor plan as a recording mechanism (see Note 7), identify all items that have the potential to be a lead hazard. Items that are not considered to be a potential lead hazard are generally not recorded. Therefore, the absence of a recorded item implies that the risk assessor did not believe that the missing item was a potential lead hazard. At a minimum, the following identifiers shall be recorded for each identified and recorded item:

(a) Record the location of the potential lead hazard.

(b) Record a description of the potential lead hazard.

(c) Record the type of potential lead hazard. Types of lead hazard areas to be identified during the visual inspection include paint, dust, and soil and are detailed in Tables 2-4. Unless specifically excluded from the scope of work *(A)*, lead hazards from water shall also be included as applicable (see Note 8). Each incidence of the types presented in these tables shall be identified (see Note 9).

NOTE 8—Some geographical areas are susceptible to lead contamination in water. Information of the susceptibility of a given assessed unit based on its geographic location and apparent construction age should be recorded. Visual inspection of plumbing for the presence of potentially leaded components is generally believed to be unproductive beyond a general assessment regarding whether older or modern materials appear to have been used. It is good practice for a lead risk assessor to inform the client that collection of water may be of value should older plumbing materials be observed during the visual inspection, particularly if the site is located in a susceptible geographic area. Actual sampling of the water may be written as a specific exclusion in the scope of work. This is because of the need to collect standing water within the plumbing system called a first-draw sample.[5] To collect this sample, access must be obtained to the site before the occupants use water for that day. An option available for the risk assessor is to provide the occupants with instructions and materials to collect a first-draw sample themselves.

NOTE 9—This guide excludes the formal investigation of personal items that may pose lead hazards such as toys, dishes, hobby materials, etc.

(d) Record and categorize the condition of the potential lead hazard. General condition information to be recorded is indicated in Tables 2-4. In addition to recording this information which will be of value during the later data reviews, categorize the physical condition of each item into one of two hazard potential categories either major or minor.

(e) For deteriorated paint, identify the potential cause of the deterioration. For each incidence of deteriorated paint, record the potential cause of the deterioration (see Note 10).

NOTE 10—Required for visual inspection reporting per 40 CFR 745 227 (d).

[5] 40CFR.141, National Primary Drinking Water Regulations.

TABLE 2 Lead Hazards from Paint or Other Coatings

Type	Description and Discussion
Deteriorated paint or other coatings	Inspect painted surfaces for deteriorated conditions. Record the presence of any defective paint surface since these surfaces can cause lead poisoning from direct ingestion of paint chips, be a primary source of lead levels in dust, and be a primary source of lead levels in soil. Deteriorated conditions include paint or other coatings that are chalking, checking, cracking, or flaking. Data to be recorded for each observed incidence shall include the location, the type of deteriorated condition, the magnitude of the deteriorated condition, the potential cause of the deterioration, and whether the location can be reached by children under age 6. The identification of deteriorated paint is based, in large part, on the judgement of the individual conducting the lead hazard assessment. As such, incidental blemishes in painted surfaces due to factors such as nail holes, etc., may or may not be classified as deteriorated paint by the risk assessor.
Paint chip accumulation	Inspect areas prone to paint chip/dust accumulation including, but not limited to window areas, along baseboard moldings, room corners at the edges of door thresholds, beneath radiators, on window sills beneath air conditioners, and on other surfaces near or under surfaces with deteriorated conditions. Airflow dynamics of the structure should be considered to help inspect areas likely to accumulate paint chips, or dust, or both. Data to be recorded for each observed incidence shall include the location and the magnitude of any accumulation.
Friction surfaces	Inspect friction surfaces for signs of paint wear including, but not limited to window areas, door areas, painted stair treads or banisters, or any other observed friction surfaces. Data to be recorded for each observed incidence shall include the location, the magnitude of the deteriorated condition, and whether the location is an accessible surface.
Mouthable or chewable surfaces	Inspect all chewable surfaces specifically for signs of wear. Painted chewable surfaces, such as window sills, stairway spindles, painted furniture or toys, etc. on which a child might teethe can lead to the direct ingestion of the lead paint. If there is direct evidence that such surfaces containing leaded paint are being chewed, this becomes a high priority for mitigation. Data to be recorded for each observed incidence shall include the location and the magnitude of the deteriorated condition.
Impact surfaces	Inspect potential impact surfaces for signs of damage. Impact surfaces should be distinguished from generally deteriorated paint or other coatings. Baseboards, door jambs, and outside corners of walls are examples of the surfaces that are frequently banged or bumped leading to the production of small chips of paint, which can be easily ingested by the child. Evidence of frequent impact means mitigation is warranted. Data to be recorded for each observed incidence shall include the location, the type of damage, the magnitude of the damage, type of impact, and whether the location is an accessible surface.
Porcelain enamel coatings and glazes	Inspect porcelain enameled coatings (bathtubs and basins) and glazes on tiles for damage and proximity to activities where they may represent a potential lead hazard. Data to be recorded for each observed incidence shall include the location, the current condition, and whether the location is an accessible surface.

TABLE 3 Lead Hazards from Dust

Type	Description/Discussion
General dust accumulation	Inspect areas prone to general dust accumulation including, but not limited to: window areas; along baseboard moldings; room corners; at the edge of door thresholds and other entries; beneath radiators, on window sills beneath air conditioners; dusty carpets/rugs/upholstery; and, on the surfaces near or under surfaces with deteriorated conditions. The movement of air through doors, windows, and ventilation systems should be considered to help inspect areas likely to accumulate dust. Particular attention should be paid to the presence of fine paint particles in the dust. Data to be recorded for each observed incidence shall include the location, appearance, and the magnitude of any accumulation.
Entryway dust accumulation	Inspect all outside to inside entryway areas for tracked-in dust or soil. Data to be recorded for each observed incidence shall include: the location; the location of any nearby sources of paint or other potential lead hazard; observations on the make-up of the dust or soil or soil (particularly the presence of any fine or course paint chips, and, the relative amount of the observed dust or soil.

7.3.2 *(E) Review Collected Data*—All available data gathered from visual inspection *(D)* and previously collected data shall be reviewed, evaluated, and summarized by the risk assessor prior to conducting personal interviews. This review and evaluation generally is conducted on-site, immediately following the visual inspection. This summarized information provides a frame of reference for asking questions and understanding answers acquired from the personal interviews.

7.3.3 *(F) Conduct Personal Interviews*—Personal interviews are not required, but are recommended as a means to understand the use and use patterns of the residence or structure being evaluated. If personal interviews are not conducted, such as in the case of unoccupied properties, assumptions must be made regarding anticipated use or use patterns. Use pattern information is needed when assigning potential lead risk categories to items identified as potential lead hazards. In general, personal interviews are more effective when conducted after completing the visual inspection and data reviews. Information gathered during those interviews may necessitate a second visual inspection to clarify the information acquired for assigning potential lead risk categories. If possible, interviews should be conducted with the occupants of the assessed unit. In the case of an unoccupied property, interviews with other persons familiar with the assessed unit may be of value: such as the owner, previous occupants, neighbors, or maintenance personnel who have worked in the dwelling. If interviews are conducted, the risk assessor shall attempt to get answers to as many of the questions shown in Table 5 as possible. Table 5 is not an exhaustive list and should be supplemented with any questions that provide useful information regarding the use of and use patterns within the dwelling. Use of pre-configured interview questionnaire forms with columns provided to record answers and other observations can provide a convenient method of recording interview data minimizing the need for extensive writing during the next review and summarization step.

7.3.4 *(G) Review Collected Data*—All available data gathered from interviewing *(F)* combined with previously collected data (*C* and *E*) shall be reviewed, evaluated, and summarized by the risk assessor prior to conducting any environmental testing (in-situ or ex-situ). A rough assessment of the potential lead hazard of each item recorded during the visual inspection process shall be performed. Items recorded with the worst physical condition combined with use patterns that often bring people into contact with these areas shall be specifically