



National Institute of
BUILDING SCIENCES

Lead-Based Paint

**Operations & Maintenance Work Practices
Manual for Homes and Buildings**

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Disclaimer

The *Lead-Based Paint: Operations & Maintenance Work Practices Manual for Homes and Buildings* was developed in response to a pressing national need for guidance concerning lead-based paint. The *Manual* was drafted by a qualified independent contractor and then extensively reviewed, modified, and refined by a NIBS project committee composed of a broad cross section of knowledgeable professionals from the building and environmental communities. It subsequently was submitted to the project committee for approval. During the review and the approval process, the project committee followed consensus rules set forth in the Rules and Procedures of the NIBS Consultative Council.

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It should be noted that operations and maintenance activities involving lead-based paint may involve health risks to the worker or others in proximity to the work. Further, experts from the building, scientific, and environmental communities have differing views concerning many aspects of proper management of in-place lead-based paint. The purpose of this document is to bring together, from many sources, information and viewpoints that reflect current knowledge and technology.

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The *Manual* is intended to serve as a guide for building owners, homeowners, employers, managers, contractors, and others in developing lead-based paint operations and maintenance programs and for workers who implement such programs. It is not the purpose or burden of this document to provide all-embracing answers to every problem of lead-based paint management. Users bear all risks associated with reliance on these work practices and have sole responsibility for evaluating the information contained herein to form their own independent judgments on the use of the *Manual*, and to modify or adapt it as may be appropriate.

The lead-based paint operations and maintenance work practices described in the *Manual* are neither laws nor regulations. While this document refers to certain federal and state laws and regulations, it is not intended to supersede or supplement any law or regulation or to identify all laws and regulations applicable to management of lead-based paint in buildings.

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Preface

The National Institute of Building Sciences (NIBS) is pleased to publish *Lead-Based Paint: Operations & Maintenance Work Practices Manual for Homes and Buildings* for use by those engaged in building operations and maintenance activities involving lead-based paint.

The Institute wishes to acknowledge the U.S. Department of Housing and Urban Development for financially supporting the development of this document and to express its appreciation for the continued assistance of the Office of Lead-Based Paint Abatement and Poisoning Prevention and its representatives, Conrad Arnolts, government technical representative, and Ronald J. Morony, P.E., acting director.

The NIBS Board of Directors appreciates the outstanding leadership of William H. Hoffman of Questco, Inc., who served as chairman of the NIBS project committee; David Mayer of Law Environmental Training Center, who served as vice-chairman; and Nora Leyland of Sherman, Dunn, Cohen, Leifer & Yellig, who served as secretary. The Institute wishes to thank Fred Eberle of Dewberry and Davis, James McCabe of LeadTech Services, Inc., and Mr. Mayer, who served as chairs of three project subcommittees. The Institute also wishes to acknowledge the excellent professional services provided by the Institute's consultants, Steve M. Hays, P.E. CIH, Greg Boothe, CIH, and Elizabeth Thompson, AIA, of Gobbell Hays Partners, Inc., and Dennis Livingston. Most importantly, the Institute wishes to acknowledge and thank the members of the project committee for their exceptional and untiring efforts in carrying out its assignment.

The *Manual* offers specific, detailed technical guidance to building owners, homeowners, program managers, contractors, workers and others for operations and maintenance activities involving lead-based paint. It does not quantify or explain the medical risks associated with lead-based paint but attempts to mitigate the potential for hazardous exposure. Such a guidance manual would not have been developed if health risks did not exist.

The *Manual* incorporates not only the collective knowledge and experience of a broad cross-section of experts but also their unique perspectives on the operation and management of buildings. The procedures set forth in the manual reflect the current status of continually evolving practices and technology. Standards and regulations for lead-based paint activities also continue to evolve and change. The project committee considered a broad range of issues including compliance with federal, state, and local regulations; varied and evolving standards of care within the industry; and a variety of concerns of building owners and managers relating to economic objectives, organization-specific environmental policies, and liability issues.

It is neither intended nor appropriate for this resource document to be used for regulatory purposes. It was purposely structured to emphasize that responsibility for decisions relating to levels of precaution and stringency within a specific building operations and maintenance program remains with the building owner or employer.

It is expected that the work practices in this *Manual* will be refined and continually improved as they are used in a wide array of operations and maintenance programs in numerous and varied building situations. The Institute encourages feedback from users as to the effectiveness of the work practices in order to improve its response to the likely need for revisions.

The *Manual* is a consensus document. Almost 200 professionals and specialists from across the spectrum of the building and environmental communities helped to formulate the guidance it offers. It is intended that building owners, homeowners, managers, designers, environmental consultants, contractors, and maintenance workers and their employers avail themselves of this reference tool in effectively managing the lead-based paint hazards in homes and buildings in a manner that adequately protects children, other occupants, and workers .

The Institute's Board of Directors recognizes and appreciates the extensive and highly professional effort and expertise that resulted in this document and is especially grateful to the members of the project steering committee who worked diligently to coordinate the development of the *Manual*. A valuable public service has been performed by the Institute's project committee and others who contributed to this superior effort.

Peter G. Doyle, FAIA
Chairman of the Board

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President

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Purpose of the Manual

Objectives This Manual is written to guide users in the safe management of lead-based paint, commonly encountered during the operation and maintenance (O&M) of homes and buildings. These procedures will help the user to: (1) control the creation of lead-contaminated dust, (2) control the scattering (dispersion) of this dust, (3) effectively clean up lead-contaminated dust and debris created by the work being done, and (4) protect the worker's health and safety.

Manual Users This Manual provides maintenance guidance to two different groups.

The first group includes owners of single family residences and owners of small (3 or 4 unit) apartment buildings who do their own maintenance work. Manual users in this group should next read *Chapter 2*, and then may skip to *Chapters 5 and 6*.

The second group includes owners and managers of multi-family residential or public and commercial buildings. Operations and Maintenance (O&M) work in these types of buildings may be performed by in-house staff or contracted to outside businesses. The Manual assumes that these maintenance workers are experienced and fully trained in their respective maintenance trades and in performing O&M work. Manual users in this group should next read *Chapter 3*, followed by *Chapters 4, 5, and 6*.

Definition: The term "operations and maintenance" is used by building owners and managers to describe the routine work necessary to operate and maintain a building whether or not lead-based paint is present. While homeowners do not use this term, work performed on houses for general upkeep is also considered "operations and maintenance" in this Manual.

The Manual has taken everyday O&M activities for all types of buildings (including homes) and modified them for situations where lead-based paint may present hazards. These activities will help protect O&M workers, building occupants, and homeowners from lead hazards. They will also help prevent contamination of the environment from the resulting dust and debris. For example, changing the hardware on painted doors is described in a way to reduce the creation of dust and debris. Any dust and debris created by the work can be contained and cleaned up by following the simple directions.

The O&M activities are described in such a way that a user can select the ones most closely resembling the work to be done. They can be modified, as explained in *Chapters 2 and 3*, for work that is similar to, but not exactly like, that described.

Assessment of Lead Hazard

Lead-Based Paint Health Effects and Hazards

Health research has revealed that lead, when swallowed or inhaled, can be harmful to human beings. It can be especially harmful to small children, pregnant women, men and women during their reproductive years, and people with hypertension. Excessive levels of lead in the blood may cause serious damage to the brain and central nervous system. High blood lead levels in adults may increase blood pressure and decrease learning ability, hearing, coordination and formation of blood cells. High blood lead can also damage kidneys and digestive systems and can injure reproductive organs. Lead poisoning in children may result in learning disabilities, including attention deficit disorder and hyperactivity, loss of hearing, mental retardation, and even death.

The lead hazards in buildings come primarily from the past use of lead-based paint. The mere presence of lead-based paint, however, does not constitute a hazard. The risk of adverse human health effects depends on the paint's location and condition and on the way occupants use the building. If circumstances are such that people, especially children, may inhale or ingest lead, then a hazard is present. Public Law 102-550 (Federal "Title X") defines lead-based paint hazard as "any condition that causes

exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-contaminated paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects as established by the appropriate federal agency."

Buildings built prior to 1978 have a higher likelihood of containing lead-based paint than those constructed after 1978. If the lead-based paint is in poor condition, hazards from dust and debris are more likely. Abrasive action on lead painted surfaces can create lead-contaminated dust in a building. Lead in bare soil outside a building can increase the lead-contaminated dust inside. Chips from exterior paint in poor condition often fall into the surrounding soil. This contaminated soil can then be brought indoors by foot traffic. Children frequently contact lead-contaminated dust and soil because they play indoors on the floor and outdoors on the ground.

Review of Building History

Persons working on a building should obtain as much information about the painted surfaces as possible. This includes any lead-based paint testing results, construction drawings or specifications indicating potential lead-based painted surfaces, historical or renovation information about the painted surfaces and any evidence that situations in a building may have caused lead poisoning.

Testing for Lead-Based Paint

Painted surfaces can be tested to determine if lead-based paint is present. If testing has not been performed, surfaces painted before 1980 should be assumed to contain lead-based paint. The guidance in the Manual should be used when working on these surfaces.

There are two primary methods for testing paint for lead: X-ray fluorescence detectors (XRF) and laboratory analysis of paint chips. A third method, using chemical kits for spot testing, has not been widely accepted as a reliable means of detecting low levels of lead in paint. However, these kits may be improved in the future and become an easier, cost effective, and more reliable way to test for lead. The most dependable way to test for a lead-paint dust hazard is wipe tests followed by laboratory analysis.

Decisions Regarding O&M Work

Worker Experience The Manual assumes that the user knows how to do the work task involved. For example, if the work that needs to be done is repairing wall plaster, then the Manual relies on the user to know how to plaster. The Manual guides the user in ways to reduce the hazards from lead-based paint while plastering. Some of the special procedures require knowledge in addition to knowing how to plaster. The Manual assumes that the user understands how to do these special procedures through training or by experience. The Manual also assumes that the user has read and understands the instructions provided by manufacturers of special equipment suggested for use around lead hazards.

In addition, federal law requires specific training for employees who work with lead-based paint. Training responsibilities mandated by the Occupational Safety and Health Administration (OSHA) are summarized and discussed in *Chapter 4, Regulations, and Guidelines Governing Lead-Based Paint*.

The United States Environmental Protection Agency (EPA) has issued proposed training regulations for workers exposed to lead-based paint. These are discussed in *Chapter 4* and outlined in *Appendix B*. Some states have their own additional training and certification requirements.

A training outline, prepared by the Society for Occupational and Environmental Health, which outlines training topics at four recommended levels (awareness, custodial, maintenance, and abatement) is also included in *Appendix B*.

Equipment Equipment and supplies necessary to perform O&M activities on lead-based paint are generally available. They consist of cleaning supplies such as cloths, mops and buckets, misting or spray bottles, clean water, tape, and plastic drop cloths. Also useful as a precautionary measure during routine cleaning, are household vacuum cleaners equipped with improved efficiency vacuum cleaner bags. These disposable bags can be purchased at vacuum cleaner retail and supply outlets. No scientific data currently exist to verify manufacturer's advertising claims for these vacuum cleaner bags.

High efficiency particulate air (HEPA) filter equipped vacuum cleaners are necessary if vacuuming will be done during or after procedures that create dust and debris. These machines, which are considerably more expensive than household vacuums, will capture very small particles. They are very effective in protecting users, occupants, and the environment.

Personal Protection Personal hygiene is very important when conducting lead-based paint O&M activities. Thorough face and hand washing should accompany any activity that disturbs the paint. Eating, drinking, and smoking should never be allowed in the work area.

To limit exposure to lead-based paint dust, protective clothing such as disposable coveralls, gloves, and boots should be worn. When conducting projects that create significant airborne dust, half-face air purifying respirators equipped with high-efficiency particulate air (HEPA) filters are recommended and are required by OSHA when airborne exposures of lead reach a certain level.

Regulations and Lead O&M Work Federal regulations are summarized in *Chapter 4, Regulations, and Guidelines Governing Lead-Based Paint*. It is important for users of the Manual also to review local and state regulations. When there is more than one regulation governing lead-based paint work, the most stringent requirements from each regulation must be followed.

Work Practice Levels

The work practice guidance in the Manual is structured around three levels of anticipated dust generation, as established by a project committee following the rules of the NIBS consensus process. The definitions of the three levels are as follows:



Level 1 A negligible amount of lead-contaminated dust may be generated, requiring a minimal amount of preparation and worker protection. Negligible may be non-visible or barely visible and localized.



Level 2 A moderate amount of lead-contaminated dust and debris will be generated or disturbed, but neither the quantities nor the duration of effort warrant full-scale work area preparation and worker protection. A moderate amount is clearly visible, may contain debris and paint chips, but will not spread beyond a small area drop cloth to any other surface in the room.



Level 3 Lead-contaminated dust and debris will be generated or disturbed in sufficient quantities and for enough time to warrant full-scale work area preparation and worker protection. A significant amount is an amount that cannot be contained simply by the use of a small area drop cloth.

The symbols shown with the level definitions above are called "icons." The Manual incorporates these icon symbols to define the level of guidance.

The Level 1 "icon" represents a loose plastic drop cloth. The Level 2 symbol is a protective foot covering referred to as a "bootie." The Level 3 "icon" represents a respirator.

Work Practice Structure

Three general procedures are described in *Chapter 5*. Sixteen work practices are described in *Chapter 6*. The work practices and general procedures were designed to be used hand-in-hand. Both were structured around the three levels of dust generation defined above. As the expected level of lead-contaminated dust generation increases, so does the level of precaution used to prepare and clean up work areas and to protect workers and occupants during performance of the work practice.

General Procedures Performance of one of the 16 work practices also requires use of one of the three general procedures. In other words, the general procedures are necessary no matter which work practice is being performed. "Icon" symbols were also developed to represent six parts of the general procedure structure. The format for the general procedures includes the following parts:

Tools & Supplies

Preparation of Work Area involving



Personal Protection



Dust Control measures



Access;

Clean-up of Work Area involving



Clean Work Surfaces
Clean Dust Control Surfaces



Worker Hygiene



Disposal.

Work Practices The five-part format for work practices includes Description, Examples, Preparation, Performance, and Clean Up.

The **Description** explains the unique nature or requirements of each work practice.

Work practice **Examples** are provided to help Manual users determine the appropriate level of preparation and protection for specific conditions in their buildings. Examples are not provided at all three levels for every work practice. If no examples are included for one level, it was deemed unlikely to be encountered under typical conditions.

Preparation and **Clean Up** refer users to those same sections of the general work procedures as appropriate.

The **Performance** portion of the work practice provides specific instructions for how to accomplish the O&M task. If Examples are provided for all 3 levels, there will be 3 sets of Performance instructions. A higher performance level may refer back to a lower level. For example, Level 2 may refer to Level 1 where specific tasks were already described in complete detail. This was done to keep the Manual as short as possible.

Homeowner Lead-Based Paint Maintenance

There are three important rules homeowners should follow when dealing with lead-based paint:

- **Never dry sand** lead-based painted surfaces.
- **Minimize dust** generation and dispersion during any work involving lead-based painted surfaces.
- **Always wet-clean.** After working on lead-based painted surfaces, always clean up using a damp wiping method, never dry sweep or dust.

Location and Extent of Lead-Based Paint Homeowners should determine which painted surfaces in their home contain, or might contain, lead-based paint (LBP). LBP was primarily used on woodwork, doors and windows. However, it can be found on any painted surface, interior or exterior. Even though regulations restricted its use after 1978, it has been found in houses built after that year. If the paint could have been applied before 1980, it should be assumed to contain lead unless proper testing proves that it does not. New layers of non-lead paint may have been applied over old LBP. It is still possible to create LBP dust if these surfaces are disturbed. Work on these painted surfaces should be performed following the Work Practices in this Manual.

Lead-Based Paint Hazard

Awareness The mere presence of lead does not constitute a hazard, however, dust or debris generated from lead can pose a risk of adverse health effects. Intact paint usually does not present a hazard, but dust or debris can be released from LBP surfaces by many actions. Before starting work on surfaces containing LBP, homeowners should determine how much LBP will be disturbed and how much dust and debris could be generated. The guidelines in the Manual will help homeowners determine which LBP O&M procedures need to be performed for a particular activity. This work may include renovation and remodeling, minor surface disturbance on painted surfaces, or abrasive actions on painted surfaces. It may also include modernization and weatherization projects that may precede renovation and remodeling to correct environmental problems (e.g., water leaks, heat loss, etc.).

Renovation and remodeling work in homes can cause release of lead-contaminated dust. Cutting, sawing, sanding, brushing, chopping, and sandblasting are all ways that lead-contaminated dust can be released from surfaces. Heating or burning lead-based paint is never recommended because this practice can release lead fumes that are especially dangerous if inhaled.

Actions that disrupt painted surfaces include a variety of routine home maintenance work, such as nailing, drilling, or screwing into painted surfaces; prying painted surfaces apart; sawing or planing painted materials; refinishing, sanding, or scraping painted surfaces, and other similar activities.

Paint failure may also be caused by moisture behind the painted surface. No work should be done before addressing the sources of moisture that may cause the paint failure.

Ongoing abrasion of lead-painted surfaces can release lead-contaminated dust. Opening and closing tightly fitted doors and windows causes friction on the painted surfaces. Movement of painted cabinet drawers and doors may also create paint dust and debris.

The most important concern for homeowners is the risk of exposure to sources of lead. Applying additional coats of paint to a LBP surface may reduce the occupants' direct contact with the lead, but the lead remains on the substrate under the new paint. Exposure risks increase whenever LBP surfaces are disturbed in any way. Inaccessible, well-maintained surfaces have a low exposure risk. Surfaces that contain lead but are kept in good condition may release little or no lead and present a low risk of lead exposure. Lead painted surfaces that can be reached or chewed by children or that have a high potential for disturbance pose a greater risk.

This Manual contains procedures designed to minimize the risk of lead-contaminated dust generation and dispersion during the disturbance of LBP. For example, procedures are provided in *Work Practice 5 (WP5)* for containing the dust and debris created while cutting painted surfaces.

These O&M procedures are a form of **temporary** lead hazard reduction often referred to as "**in-place management**" or as "**interim controls**." It is important that the LBP surfaces be monitored at least every 3 to 6 months to determine if the surface condition has changed. Deterioration of the painted surface or substrate may require additional abatement procedures.

Recommended housekeeping procedures included in this chapter are designed to minimize the accumulation of lead-contaminated dust and debris. It is recommended that these housekeeping procedures be routinely used in homes and apartments containing lead-based paint.

Lead-Based Paint Testing

Testing for Lead in the Home

Lead is detected in paint by testing painted surfaces. This section discusses several different methods of testing paint for lead. These tests have varying degrees of accuracy and sensitivity. Some of the tests measure the percentage of lead in the paint; others measure the amount of lead in an area of paint. One of the tests only shows whether or not the paint contains lead. Two important criteria to consider are whether they can be done by homeowners and whether they can be performed on-site.

State and local public health organizations can provide lists of consultants who perform these testing services. The EPA maintains a Lead Hotline (**1-800/LEAD-FYI**) for assistance and will send testing and laboratory information on request. The EPA, the American Association for Laboratory Accreditation (A2LA 301/670-1377) and the American Industrial Hygiene Association (AIHA 703/849-8888) will provide a list of accredited laboratories on request.

The Department of Housing and Urban Development (HUD) defines LBP as any paint, varnish, stain or other coating that contains lead equal to or greater than 1.0 mg/cm² (milligram per square centimeter) or 0.5 percent by weight. However, even if lead concentrations below these levels are detected in paint, disturbing the paint may cause the potential problem of lead poisoning. State and local definitions of LBP may differ from HUD's definition. Users must follow the most stringent of the federal, state and local regulations.

Testing by Owner Several forms of testing for lead may be performed successfully by homeowners. They are chemical spot testing and collection of either dust wipe samples or paint chip samples to be sent to a laboratory for analysis. None of these testing methods is overly complex. The success of any testing method, however, depends on careful and precise compliance with recommended procedures. Homeowners sending analysis samples to laboratories should include precise descriptions of how the samples were collected.

Dust Wipe Sampling Homeowners may choose to take dust wipe samples as an initial lead hazard assessment. Such testing should emphasize rooms in which children are most likely to play. If test results are negative, it may indicate that there is no immediate risk of exposure to lead-based paint.

Sampling Instructions:

Identify and document all areas to be sampled, room by room. Take care not to remove any substrate material. This documentation should include:

- **Location of samples.** Floor samples should be taken near the edge of the room, not the center
- **Surface type** (floor, sill, trough)
- **Surface material** (wood, metal, resilient flooring)

● **Surface area measurements.** All areas must be measured precisely. On floors measure out a 12 inch by 12 inch area. On window troughs and stools measure the area to be wiped.

Materials Needed:

● **Baby wipes.** Use thin, non-alcohol, aloe free, unscented wipes. The wipes must be wet. Dispose of any "dried out" wipes. Because some baby wipes cannot be processed by the laboratory, the person taking the sample should contact the laboratory to determine which brands of baby wipes are acceptable.

● **Measuring tape or ruler**

● **Plastic containers with sealable tops.**

The samples should be sent to the laboratory in plastic containers because the inside of the container must be rinsed out at the lab and also analyzed. Sandwich type bags should not be used. The person taking the sample should contact the laboratory to determine which containers are acceptable to that particular laboratory

● **Disposable gloves.** A different pair of gloves should be used for each sample to prevent cross-contamination.

Procedure:

First - Put on disposable gloves

Second - Throw out the first wipe in the container because it is probably contaminated

Third - Place the next wipe flat on the surface to be sampled. Rub the wipe in an "S" pattern over the entire measured surface. Use an even pressure without scrubbing the surface

Fourth - Fold the wipe in half, dirty side in, and wipe the entire measured surface again, at a 90 degree angle to the first wipe

Fifth - Fold the wipe in half, dirty side in, and place in the plastic container

Sixth - Mark the container with the sample number, location and surface (floor, troughs, sill)

Seventh - Change gloves

Eighth - Repeat the procedure for each sample area

Ninth - Place an unused baby wipe into a sample container and mark it as another sample

Tenth - Submit all the samples to the laboratory for analysis. A sheet should be included summarizing the sample locations. It should be signed and dated just before sealing the shipping container.

Dust wipe samples may also be taken for "clearance testing" which is discussed on page 19 of this chapter.

Chemical Spot Tests Chemical spot testing is another way to identify LBP. The test is easy to perform and readily available to homeowners. This test gives a Yes-No indication of whether lead is present through a color change in the chemicals on the tip of an applicator. This test costs less than the others, but can give erroneous results. The error may be what is called a "**false negative**," indicating that lead is not present when in fact it is, or a "**false positive**," indicating that lead is present when it is not.

This test is used primarily for initial screening to indicate the presence of LBP. It does not indicate the percentage of lead in the paint. If the test indicates LBP is present, take appropriate actions. If the test indicates there is no lead, the surface should be tested by one of the other methods before using non-lead work procedures.

Paint Sample Collection

Procedures If homeowners decide to collect paint samples to send to a laboratory, the following procedure should be used:

First - Determine which area(s) and material(s) will be sampled. The home should be divided into representative areas by component. Components with different types of paint should be divided into separate areas.

Second - Wear new latex ("kitchen/household") or disposable gloves while taking paint samples.

Third - Wet the area where the sample

will be taken. Water in a spray bottle works well.

Fourth - Tape a plastic bag (zipper-lock type bags work well) or other suitable container below the area to be sampled to catch the paint chip or flakes.

Fifth - Carefully remove an area of paint (about the size of a quarter) from the surface using a scraper, knife, putty knife, or similar tool. The chips should be placed in the plastic bag. All layers of the paint must be removed. However, try to include as little of the underlying material as possible. A new plastic bag must be used for each area sampled.

Sixth - Seal the container (lock the bag, or fold the edge over and tape shut) and write a description of the sample location and the date of collection on a label on the outside of the container.

Seventh - Submit the samples to a laboratory accredited under the requirements of the National Lead Laboratory Accreditation Program (see *Chapter 3 - Selection of a Laboratory*).

Eighth - The samples will be analyzed at the laboratory as described on page 18 below.

Testing by Consultant In addition to chemical spot testing and the sampling methods discussed above, LBP consultants currently use two much more sophisticated testing methods. A third method has recently been introduced to the market as well. See *Chapter 3 page 34* for information on selecting a qualified consultant.

X-Ray Fluorescence X-Ray Fluorescence (XRF) detectors are portable and have the capability of providing analysis of lead levels almost immediately. However, the XRF detectors are very expensive and require special training and licensing. Contact a qualified consultant to perform such a lead inspection. Some states have a certificate program for inspectors. The testing will be performed on-site. The results are normally reported as milligrams per square centimeter (mg/cm^2). The inspector or consultant will usually provide an interpretation of the results. XRF testing for certain levels of lead requires confirmation by laboratory analysis.

Laboratory testing Laboratory testing of paint samples generally provides the most accurate results. The samples are usually analyzed by Atomic Absorption Spectroscopy (AAS), or Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). Paint sample testing is more expensive, per sample, than the other methods. Results from laboratory testing are normally reported as micrograms per gram ($\mu\text{g}/\text{g}$), parts per million (ppm) or percent (%) by weight. If homeowners choose to collect their own laboratory samples, they should use the *Paint Sample Collection* procedures

described above.

Anodic Stripping Voltammetry Anodic Stripping Voltammetry (ASV), a new portable technology performed on site, claims to provide the same accuracy as laboratory analysis by AAS. The per sample costs of AAS and ASV are comparable and require the same paint sample, but the ASV test can be completed in less than an hour, AAS testing requires several days. ASV method is currently being evaluated by the EPA.

Testing Following Lead-Based Paint Work

"Clearance Testing" is usually performed after maintenance or renovation procedures that produce large amounts of lead-contaminated dust and debris. This test involves laboratory analysis of dust wipe samples described above on page 15 of this chapter. Clearance testing is used to ensure that work areas have been cleaned well enough to allow occupants to return.

Homeowners performing work practices themselves should visually inspect the work area after clean-up procedures are completed. No visible dust or debris should be left in the work area.

Clearance testing should definitely be considered when dust and debris spread beyond the drop cloth area. This is true whether the work was done by homeowners or by hired contractors. Homeowners should compare the results received from the laboratory to clearance levels established by HUD for use in Public and Indian Housing. The HUD levels are generally used when clearance testing is done. As of early 1995, the **HUD clearance levels** are:

100 µg per square foot for **floors**

500 µg per square foot for **interior window sills**

800 µg per square foot for **window troughs** (window wells) and exterior concrete or other rough surfaces

If testing results show lead levels above the HUD clearance levels, the work area should be recleaned and retested.

Recommended Housekeeping Procedures

After lead-based paint has been found in a building, it is especially important to continue routine cleaning. This section recommends a set of prudent cleaning procedures intended to minimize, or prevent, the risk of exposure to accumulated lead-contaminated dust in houses and apartments. As described above, lead-contaminated dust can be generated by the friction of painted surfaces. Window sills, stools, and troughs are likely areas for this type of dust accumulation. Exterior lead-contaminated dust may also be tracked into and accumulate on and around residential entry ways.

The recommended housekeeping procedure is periodic damp wiping or wet cleaning of areas such as those mentioned above. Horizontal surfaces (e.g., floors, stairs) where children frequently play should receive special attention.

Increased efficiency vacuum cleaner bags are advertised by many manufacturers for use with normal vacuum cleaners. This Manual recommends their use as a reasonably inexpensive precaution for routine cleaning where no LBP chips or dust are present, though no scientific data currently exists to verify the manufacturer's advertising claims. If homeowners happen to have access to HEPA vacuum equipment, its periodic use for normal cleaning is strongly recommended.

Caution: Any cleaning or housekeeping activity that generates visible dust from chipping or flaking of known lead-based paint should be stopped immediately.

If lead-contaminated dust or debris are present, use Work Practice WP1 - *Cleaning Damaged or Deteriorated Surfaces* or WP2 - *Removing Paint Chips and Debris* to clean the areas.

Cleaning floors

Recommended:

- damp or wet mopping
- standard "sponge" or "string" type mops and mild detergent
- standard vacuum cleaners with increased efficiency vacuum cleaner bags if no visible LBP dust or debris is present

Avoid:

- mops with a "scrubber" strip attached
- powered buffing or polishing equipment
- vacuums with "beater bars" that may abrade the painted surface

Cleaning carpets and rugs

Recommended:

- "wet scrubbing" methods to remove stains
- steam cleaning methods
- standard vacuum cleaners with increased efficiency vacuum cleaner bags if no visible dust or debris from LBP is present

Avoid:

- dry sweeping of surface dust and debris
- shaking or "beating" of carpets and rugs

Cleaning walls

Recommended:

- wet wipe wall completely with non-abrasive cloth
- mild detergents

Avoid:

- steel wool, scouring pads and abrasive cleaners
- solvents that may dissolve paint

Cleaning other painted surfaces

Recommended:

- non-abrasive cloths and mild detergents

Avoid:

- abrasive cleaners and scouring pads
- solvent cleaners that may dissolve the paint
- excessive rubbing of spots to remove them

Dusting

Recommended:

- use normal, non-abrasive dusting cloths or "dusters"

Using Work Practices

Structure of Chapters 5 & 6

Chapter 5 describes 3 general work procedures. *Chapter 6* describes 16 specific work practices. They were designed to minimize the generation of lead-contaminated dust and to control the spread of dust and debris that may contain lead. The work practices and the general procedures were structured around the 3 levels of dust generation defined at the end of *Chapter 1*. As the expected level of dust generation increases, so does the level of precaution used to prepare work areas and to protect workers and occupants.

The general procedures describe work required in conjunction with any of the work practices. The format for the general procedures includes the following three parts: Supplies & Tools; preparation of Work Area involving [1] Personal Protection, [2] Dust Control, and [3] Access; and Clean-up of Work Area involving [1] Clean Work Surfaces, [2] Clean Dust Control surfaces, [3] Worker Hygiene, and [4] Disposal.

There is a five-part format for the work practices; Description, Examples, Preparation, Performance, and Clean Up. The Description explains the unique nature or requirements of each work practice. The Examples are provided to help homeowners select the appropriate level of work practice for the specific conditions in their homes. All three levels are not provided for every work practice. If no examples are included for one level, it was deemed unlikely to be encountered under typical conditions.

Caution: Homeowners may decide to perform Level 1 and Level 2 activities, but should not perform Level 3 activities. Trained contractors should be hired for all Level 3 LBP O&M work.

Preparation and Clean Up refer homeowners to these sections of the general work procedures at Level 1 or Level 2, as appropriate. The Performance part of the work practice provides specific instructions for how to accomplish the lead O&M task.

The Manual assumes that O&M workers, including homeowners, know how to do the O&M work tasks involved. The Manual addresses the steps required to minimize lead exposures while doing the work in areas containing lead paint.

If Examples are provided for all 3 levels, there will be 3 sets of Performance instructions. Level 2 Performance may refer homeowners to Level 1 where specific tasks are already described in complete detail. This was done to keep the Manual as short as possible.

Using the Work Practices

Homeowners should review the Work Practice Summary to find the work practice most resembling the work task to be done in their residence. For example, a homeowner needing to install acoustic tile on a wall where LBP was chipped, would choose

WP9 - Installing Materials Over Lead-Painted Surfaces. The homeowner should flip to **WP9** to review the Level 1 and Level 2 Examples to determine the appropriate work practice level. If Level 2 is selected, the homeowner should next review all three parts of the Level 2 General Procedures and study the performance instructions ensuring that all required supplies and tools are on hand.

WP9 ■ Installing Materials Over Lead-Painted Surfaces

Description

Most materials can be installed over lead-painted surfaces. Surface preparation is an important element of this work practice. In some situations it may be desirable to first perform *WP1 - Removing Paint Chips and Debris* and/or *WP11 - Patching a Lead-Painted Surface at Level 3*. *WP9* can then be executed at a lower level. These materials are not effective in creating "enclosure" to prevent migration of lead paint dust.

Examples

Level 1

- Installing carpet or resilient flooring over floors with paint intact and substrate in good condition.
- Installing acoustic, or decorative tile, over walls or ceilings with paint intact and substrate in good condition.
- Installing paper, vinyl, or fabric wall or ceiling coverings over surfaces in good condition.

Level 2

- Installing carpet or resilient flooring over floors with chipped or cracked paint.
- Installing acoustic, or decorative tile, over walls or ceilings with chipped or cracked paint.
- Installing paper, vinyl, or fabric wall or ceiling coverings over painted surfaces that are chipped or cracked.

Caution: In some cases these activities could generate more than a moderate amount of dust and debris, requiring Level 3 work practices.

Level 3

- Installing resilient flooring over floors with chipped, cracked, or flaking paint and a deteriorated substrate.
- Installing acoustic, or decorative tile, over walls or ceilings with chipped, cracked, or flaking paint and a deteriorated substrate.
- Installing paper, vinyl, or fabric wall, or ceiling coverings over painted surfaces that are chipped or cracked with deteriorated substrate (not a recommended practice.)


Returning to the **WP9** example above, when all requirements are understood and all supplies and tools are in hand, the homeowner should perform the Level 2 General Procedure "Preparation" instructions. Once this is done, the homeowner should follow the Level 2 Performance instructions in **WP9**, followed by the Level 2 General Procedures "Clean Up" instructions.

Work Practice _____


Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1 _____


 **Installation:**
Carefully cut, fit, and install materials without disturbing the surface. If paint chips or debris are created, wet wipe the surfaces and plastic drop cloth and place in a disposal bag.

Performance ■ Level 2 _____

 **Surface preparation:**
For work on floors, surround the work surface with drop cloths, taping down the edges. Mist the surface. Use a putty knife or scraper to remove all loose paint from the work surface (*WP1 - Removing Paint Chips and Debris*). Damp mop or wet wipe the surface before installation.

Installation:
Follow the *Level 1* installation instructions.

Performance ■ Level 3 _____

 **Surface preparation:**
Use the *Level 2* surface preparation procedures. Use a HEPA vacuum to collect excess dust and debris (*WP1 - Removing Paint Chips and Debris*) before wet mopping or wet wiping (*WP2 - Cleaning Damaged or Deteriorated Surfaces*). Use Work Practice *WPS - Penetrating Lead-Based Paint* to remove substrate material before installation. Use Work Practice *WP11 - Patching a Lead-Painted Surface* to patch the surface before installation.

Installation:
Follow the *Level 1* installation instructions.

Clean-Up

Perform clean-up according to the *General Procedures* corresponding to the actual level of work being performed.

Homeowners may find it more convenient to remove both the work practice and the general procedure from the Manual binder prior to beginning the work.

If a specific activity is not described in one of the work practices, homeowners can combine or modify one or more of the work practices.

Caution: "Modifying a work practice" does not suggest lowering the quality of any dust-containing or respiratory protection measures described in the work practices.

Recordkeeping

All documents related to the operations and maintenance of lead-based paint in a building should be kept by the Owner. These documents may include, but are not limited to: surveys for lead-based paint; lead testing laboratory reports; and records of O&M work that

has altered, enclosed or removed lead-based paint. All known information concerning lead-based paint and lead-based paint hazards is required by law to be disclosed to the buyer when the property is sold.

Waste Disposal

Waste generated during O&M work may be regulated as hazardous waste under the Resource Conservation and Recovery Act (RCRA) and under state and/or local regulations. Hazardous waste requirements under RCRA and state/local regulations describe the procedures necessary to ensure that waste handling and disposal will not adversely impact the environment.

Homeowners who generate lead-based paint containing waste and debris from their own home generally are exempt from RCRA requirements. However, some states do not allow this homeowner exclusion, while other states allow for the exclusion even if a hired person performs the work. Non-homeowners (such as businesses, contractors or owners working on leased residences) who generate lead-based paint containing waste during O&M (or construction) operations on residences or commercial properties are subject to

RCRA requirements if they produce 220 pounds or more of such waste in a month, or store 2200 pounds or more of it on-site. Some states have much lower requirements.

In all cases, managers/landlords, businesses and contractors involved with O&M practices in residential or commercial structures should verify disposal requirements with the appropriate state and local environmental regulatory agencies. At a minimum, even non-hazardous waste should be handled or contained in a manner to prevent the spread of dust and debris outside work areas. Careful handling of painted items, such as wood trim can prevent the spread of lead-contaminated dust and debris. Polyethylene bags are good for containing dust and small size debris. Larger building components with flaking and chipping paint should be wrapped and sealed in plastic.

Instructions for Using this Chapter

Owners and managers of multi-family residential, public, and commercial facilities normally prepare written O&M lead-based paint (LBP) programs for their buildings. Each program should be designed to meet the particular needs of a specific location. The Manual was designed to assist owners and managers in accomplishing that purpose. It provides the basic information necessary to develop an O&M lead program. O&M is a form of **temporary** lead hazard reduction often referred to as "**in-place management**" or "**interim controls.**" LBP surfaces should be surveyed periodically to monitor the condition of the paint and substrate so that preventative action can be taken to minimize surface deterioration. It is very difficult in a guidance document such as this, to address every lead-based paint situation that might be encountered in buildings.

In commercial and public buildings, except in child-care facilities or other spaces frequented by children, the primary audience of concern is the maintenance and custodial workers who are actually performing these work practices. Occupants of public and commercial buildings are less likely to encounter risk of exposure to lead paint contamination than are occupants of residential buildings.

The last section of this chapter is a sample O&M program. Site-specific information should be inserted (where the prompts are shown in parentheses) to tailor the program to a particular location. Owners may wish to place the completed O&M program in a separate binder with the General Procedures and Work Practices from *Chapters 5 and 6* appropriate for their buildings.

Prior to attempting to develop a site-specific O&M program, both *Chapter 1* and *Chapter 4* should be read. *Chapter 1* provides background information on lead hazards and LBP O&M work. *Chapter 4* summarizes the regulatory requirements relating to lead work in and around buildings.

O&M Program

A written O&M program should be kept in an accessible location at the site. It describes how the building management and workers will minimize lead exposures while performing normal operations and maintenance procedures. The basic contents of a written O&M program are:

1. General Information An O&M program may include general information about the physical plant, including the facility name, address, number of buildings, and total square footage of each building.

2. Designated Person One person should be designated to manage the lead-based paint O&M program. This person should be trained in lead hazards and in specific requirements for operations and maintenance activities around lead-painted surfaces. The designated person's name, title, and phone number should be listed in the O&M program.

3. Survey Results All lead inspection or survey results should be part of the O&M program. X-Ray Fluorescence (XRF) reports, laboratory analyses results, spot-testing results, field sheets, and field notes should be organized in a section of the document. Survey results should be easily accessible for reference. LBP surfaces should be visually inspected periodically depending on conditions. This section should be updated when additional lead surveys are performed.

4. Location of Lead-Based Paint The survey results provide a description of the location of lead-based paint. An easy way to compile these results is to mark the locations on construction (as-built) drawings. The location of LBP should be updated as new survey results are obtained and when LBP is removed. Any enclosures around LBP should also be noted on the construction drawings.

5. General Procedures and Work Practices The General Procedures and Work Practices which apply to the site should be included in a separate section of the O&M program. The procedures and work practices for specific tasks can be removed from the O&M program and used by maintenance workers in performing O&M activities.

6. Training All worker training must comply with federal, state and local requirements and should be documented in the O&M program. Documentation requires placing copies of training certificates, class rosters, and course outlines in a section of the program file. The section should be updated as additional training is completed.

Lead-Based Paint Testing

Testing for the presence of lead-based paint is recommended as part of a risk assessment for LBP hazards. HUD defines **lead-based paint** as any paint, varnish, stain or other applied coating that has 1 mg/cm² or 0.5% by weight (5,000 µg/g or 5,000 ppm by dry weight) or more of lead. However, even if level concentrations below these levels are detected, disturbing the paint may create the potential for lead poisoning.

This section describes how to test for lead, how to use test data, and how to select consultants or laboratories.

Lead-Based Paint Testing

There are four methods currently available for testing for the presence of lead-based paint. The first two methods discussed are the most commonly used, and most widely accepted. The second two are relatively new testing methods; their accuracy currently is being evaluated.

Portable XRF Detectors X-Ray fluorescence (XRF) detection is a relatively inexpensive method of testing paint for lead content when performed by a consultant. However, the XRF detectors are very expensive to purchase and require special training and licensing, which prevents most owners from performing their own testing. XRF detection provides rapid test results and usually does not require the removal of paint from a surface. The results are normally reported as milligrams per square centimeter (mg/cm²) of paint surface area. Testing is performed on-site because XRF detectors are portable. XRF readings at certain levels of lead may

require laboratory confirmation.

A report of XRF results usually provides sample locations and a series of individual readings for each surface tested. Reports may also provide apparent lead concentrations (ALC), substrate equivalent lead (SEL), or corrected lead concentration (CLC). See *Appendix A - Glossary* for an explanation of these terms. XRF report forms vary considerably from consultant to consultant.

Laboratory Analysis of Paint

Samples Laboratory testing of paint samples can provide the most accurate results of lead content in paint. Samples are sent to a laboratory and the analysis takes a number of days. The samples are usually analyzed by Atomic Absorption Spectroscopy (AAS) or Inductively Coupled Plasma - Atomic Emission Spectroscopy (ICP-AES). Laboratory analysis is more expensive per sample than other methods.

Laboratory analysis reports usually provide sample number, reference to the type of analysis performed, and the test results. If the lab was given a precise measurement of the sample area, the result can be reported as mg/cm². The results are usually reported as micrograms of lead per gram of paint (µg/g), parts per million (ppm) or percent (%) by weight.

Taking Paint Samples The following procedures may be used by owners who want to take their own paint samples to send for laboratory analysis:

First, determine which area(s) and material(s) will be sampled. The home should be divided into representative areas by component. Components with different types of paint should be divided into separate areas.

Second, wear new latex ("kitchen/household") or disposable gloves while taking paint samples.

Third, wet the area where the sample will be taken. Water in a spray bottle will work well.

Fourth, tape a plastic bag (zipper-lock type bags work well) or other suitable container below the area to be sampled to catch the paint chip or flakes.

Fifth, carefully remove an area of paint (about the size of a quarter) from the surface using a scraper, knife, putty knife, or similar tool. Place chips in the plastic bag. All layers of the paint must be removed. However, try to include as little of the underlying material as possible. A new plastic bag must be used for each area sampled.

Sixth, seal the container (lock the bag, or fold the edge over and tape shut) and write a description of the sample location and the date of collection on a label on the outside of the container.

Seventh, submit the samples to a laboratory accredited under the requirements of the National Lead Laboratory Accreditation Program (see *page 34 - Selection of a Laboratory*).

Eighth, the samples will be analyzed at the laboratory as described on *page 29*.

Anodic Stripping Voltammetry

Anodic Stripping Voltammetry (ASV) is a new test method recently introduced to the market. This technology is portable, performed on site, and claims to provide the same accuracy as laboratory analysis by AAS. The per sample costs of AAS and ASV are comparable and require the same type of paint sample, but the ASV test can be completed in less than an hour. This test method is not complicated and does not require elaborate operator training nor certification. The ASV testing device though not inexpensive is much cheaper than XRF equipment. ASV is being evaluated by the EPA.

Chemical Spot Tests Chemical spot testing is another way to identify LBP. The test is easy to perform and readily available to homeowners. This test gives a Yes-No indication of whether lead is present through a color change in the chemicals on the tip of an applicator. This test costs less than the others, but can give erroneous results. The error may be what is called a "false negative," indicating that lead is not present when in fact it is, or a "false positive," indicating that lead is present when it is not.

This test is used primarily for initial screening to indicate the presence of LBP. It does not indicate the percentage of lead in the paint. If the test indicates LBP is present, take appropriate actions. If the test indicates there is no lead, the surface should be tested by one of the other methods before using non-lead work procedures. HUD does not recommend the use of chemical spot tests.

Dust Wipe Sampling Owners may choose to take dust wipe samples as an initial lead hazard assessment. Such testing, in residences, should emphasize rooms in which children are most likely to play. In public and commercial buildings, any areas likely to be occupied by children should be emphasized. Day care centers are a prime example. If test results are negative, it may indicate that there is no immediate risk of exposure to lead-based paint in the building areas.

Sampling Instructions:

Identify and document all areas to be sampled, room by room. Take care not to remove any substrate material. This documentation should include:

- **Location of samples.** Floor samples should be taken near the edge of the room, not the center
- **Surface type** (floor, sill, trough)
- **Surface material** (wood, metal, resilient flooring)
- **Surface area measurements.** All areas must be measured precisely. On floors measure out a 12 inch by 12 inch area. On window troughs and stools measure the area to be wiped.

Materials Needed:

- **Baby wipes.** Use thin, non-alcohol, aloe free, unscented wipes. The wipes must be wet. Dispose of any "dried out" wipes. Because some baby wipes cannot be processed by the laboratory, the person taking the sample should contact the laboratory to determine which brands of baby wipes are acceptable.
- **Measuring tape or ruler**
- **Plastic containers with sealable tops.** The samples should be sent to the laboratory in plastic containers because the inside of the container must be rinsed out at the lab and also analyzed. Sandwich type bags should not be used. The person taking the sample should contact the laboratory to determine which containers are acceptable to that particular laboratory
- **Disposable gloves.** A different pair of gloves should be used for each sample to prevent cross-contamination.

Procedure:

First - Put on disposable gloves

Second - Throw out the first wipe in the container because it is probably contaminated

Third - Place the next wipe flat on the surface to be sampled. Rub the wipe in an "S" pattern over the entire measured surface. Use an even pressure without scrubbing the surface

Fourth - Fold the wipe in half, dirty side in, and wipe the entire measured surface again, at a 90 degree angle to the first wipe

Fifth - Fold the wipe in half, dirty side in, and place in the plastic container

Sixth - Mark the container with the sample number, location and surface (floor, troughs, sill)

Seventh - Change gloves

Eighth - Repeat the procedure for each sample area

Ninth - Place an unused baby wipe into a sample container and mark it as another sample

Tenth - Submit all the samples to the laboratory for analysis. A sheet should be included summarizing the sample locations. It should be signed and dated just before sealing the shipping container.

Dust wipe samples may also be taken for "clearance testing" which is discussed on page 33 of this chapter.

Guidelines for risk assessment and paint inspection can be found in the Department of Housing and Urban Development's (HUD) *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, 1995*. The 1995 HUD guidelines are discussed in **Chapter 4, on page 58** and the Executive Summary is presented in **Appendix C** of this Manual, along with a discussion of the HUD interim guidelines (1990.)

Testing Following Lead-Based Paint Work

"Clearance Testing" is usually performed after maintenance or renovation procedures that produced large amounts of lead-contaminated dust and debris. This test involves laboratory analysis of dust wipe samples, described on page 29. Clearance testing is used to ensure that work areas have been cleaned well enough to allow occupants to return.

Workers performing work practices in this Manual should visually inspect the work area after clean-up procedures are completed. No visible dust or debris should be left in the work area.

Clearance testing should definitely be considered when dust and debris spread beyond the drop cloth area. This is true whether the work was done by homeowners or by hired contractors. The designated person should compare the results received from the laboratory to clearance levels established by HUD for use in Public and Indian Housing. The HUD levels are generally used when clearance testing is done. As of early 1995, the **HUD clearance levels** are:

100 µg per square foot for **floors**
500 µg per square foot for **interior window sills**
800 µg per square foot for **window troughs** (window wells) and exterior concrete or other rough surfaces

If testing results show lead levels above the HUD clearance levels, the work area should be recleaned and retested.

Using Test Data to Modify and Validate Work Practices

If an O&M work practice fails either the visual or clearance tests, the work practice should be reviewed. The designated person should determine whether the appropriate work practice is being used at the proper work practice level and whether the work practice is being performed correctly. If the work practice continues to fail visual and clearance testing, the designated person may decide to modify the work practice or consider choosing a different level of the same work practice or a different work practice.

Selecting Consultants and Laboratories

It is very important to select qualified consultants and laboratories when testing for lead-based paint. The quality of results depends on the accuracy and precision of the testing and laboratory analysis. This section provides guidance for selection of qualified consultants and laboratories.

Selecting a Consultant Qualified consultants should have the following capabilities and attributes:

- Thorough working knowledge of all relevant federal, state, and local testing regulations;
- Thorough knowledge of the required or recommended methods for testing the lead content of paint;
- State certification and/or license where required;
- Ability to accurately identify lead hazards;
- Knowledge of the use and applicability of the sampling and analytical methods and equipment to be employed;
- Ability to recognize situations in which laboratory analysis of paint is necessary;
- Ability to document clearly and unambiguously testing results and locations;
- Must notify appropriate officials or agencies of the test results; and be
- Honest, ethical, precise and thorough.

Selection of a Laboratory The following are standard practices associated with good laboratory operation. This section is intended to help identify appropriate laboratories to perform lead analysis.

- Laboratories should be able to document that they have instituted a range of standard organizational and operating procedures (SOPs) to ensure consistent, reliable analysis data. One of the primary SOPs is referred to as a Quality Assurance/Quality Control program. Laboratories should be able to provide copies of their QA/QC Manual upon request
- Laboratory personnel must have the education, training, technical knowledge, and experience necessary to perform their assigned duties. Most laboratories will provide copies of "statement of qualifications" upon request
- Only use laboratories accredited under the Environmental Protection Agency's (EPA) National Lead Laboratory Accreditation Program (NLLAP) to analyze samples for lead contamination
- At present, two organizations offer accreditation that is accepted under NLLAP by the EPA. Those are the American Association for Laboratory Accreditation (A2LA) and the American Industrial Hygiene Association (AIHA)

Selecting Work Practices

Chapter 6 contains work practices designed to minimize and contain lead-contaminated dust and debris while performing O&M activities. These work practices should be used any time work activities will disturb a lead-painted surface or a surface assumed to contain lead.

Several decisions must be made before beginning an O&M activity that will disturb LBP. The first step is to determine the proper work practice. The second, and most important step, is to determine the appropriate work practice level for performing the task. The next step is to study the actual performance instructions to ensure that they are sufficient to complete the specific task at hand without modification. The final step is to validate, if possible, whether earlier use of the selected work practice was successful and to change the work practice level or select a different work practice, if the one selected was unsuccessful.

Selecting Work Practice The designated person should review the *Work Practice Summary in Chapter 6* to select the work practice most resembling the task to be performed. For example, to install mini-blinds on a lead-based paint covered wall, *WP7 - Attaching to a Lead-Painted Surface* would be selected. The description portion of the work practice should be read to confirm the selection.

Determining Level of Work Practice

The designated person should next review the Examples for all Levels described in the work practice. The scope of the task, how long the work will continue, and especially the condition of the LBP and substrate to be disturbed must be considered. If there is any question regarding the condition of LBP, the work area should be reevaluated prior to determining the work practice level.

Modifications to Work Practices

Complex activities not specifically described in the work practices can usually be performed by modifying and combining various parts of several different work practices. For example, to replace a metal fireplace unit in an apartment might require the following combination of work practices:

WP1 - Removing Paint Chips and Debris,
WP6 - Removing Components from Lead-Painted Surfaces,
WP7 - Attaching to a Lead-Painted Surface,
WP11 - Patching a Lead-Painted Surface,
WP12 - Exposing Lead-Painted Contaminated Cavities,

Caution: "Modifying a work practice" does not suggest lowering the quality of any dust-containing or respiratory protection measures described in the work practices. When combining work practices, the highest level of preparation and worker protection should be followed.

Validation The designated person should review the results of previous use of any work practices being assigned. Any air monitoring results associated with the work practice should be carefully reviewed. Failure, especially repeated failure, of visual or clearance testing should be considered when determining or changing the work practice level or the work practice itself.

O&M Program Management

Scheduling O&M work activities disturbing lead-based painted surfaces should be scheduled through the designated person. Appendices D - G are sample maintenance forms that can be used to schedule lead O&M work.

Appendix D - Job Request Form For Maintenance Work

Appendix E - Maintenance Work Authorization Form

Appendix F - Evaluation of Work Affecting Lead-Based Paint

Appendix G - Waste Tracking Form

A major scheduling issue has to do with the need to relocate building occupants. Ideally, work areas should be vacant while LBP O&M work is taking place. **Access** and **Containment** are significant segments of the "Preparation" General Work Procedures. An effort should be made to schedule Level 3 work practices during tenant turnover.

Notification of Occupants

Residents and building occupants should be informed of the presence of lead-based paint and hazards associated with it. In most instances it is the owner or lessor's responsibility to communicate this information to the lessee, not to the individual occupants. *Appendix H* is a sample letter that may be used for this purpose. Occupants should understand the importance both of not disturbing lead-based paint and of reporting the presence of chipping/flaking paint or visible dust and debris.

Occupants should be notified prior to the start of lead-based paint O&M work affecting areas they use. Occupants should receive advanced notice when relocation will be necessary.

Training The work practices are intended to minimize lead exposure both to workers and to buildings' occupants. Workers should not undertake any of these tasks, however, without having a basic understanding of the hazards of lead, the measures needed to protect themselves and others from lead exposure, and at least the minimum training required by law. *Chapter 4* describes OSHA training requirements and proposed EPA regulations for lead abatement workers. In addition, state and local regulations should be consulted. Residential and public curricula has been approved and available to the public since June 1990. *Appendix B* of this Manual is a suggested training outline developed by the Society for Occupational and Environmental Health (SOEH). It proposes four levels of training; awareness, custodial, maintenance, and abatement. Awareness training should be provided to all O&M personnel regardless of the level of the task performed.

The designated person should ensure that all O&M workers have received proper and required LBP training. *Appendix I* is a sample form that may be used to record worker training.

Caution: The Manual assumes that O&M workers know how to do the work tasks involved. The Manual addresses the steps required to minimize lead exposures while doing the work.

Recommended Housekeeping Procedures Owners will continue to clean their building after learning that lead-based paint is present. This section recommends a set of prudent cleaning procedures intended to minimize, or to prevent, the risk of exposure to accumulated lead-contaminated dust in residential and other buildings. As described above, lead-contaminated dust can be generated by the friction of painted surfaces. Window sills, stools and troughs are likely areas for this type of lead-contaminated dust accumulation. Exterior lead-contaminated dust may also be tracked into and accumulate on and around entryways.

The recommended housekeeping procedure is periodic damp wiping or wet cleaning of areas such as those mentioned above. Horizontal surfaces (e.g., floors, stairs) where children play frequently should receive special attention.

Increased efficiency vacuum cleaner bags are advertised by many manufacturers for use with normal vacuum cleaners. Their use is recommended as a reasonably inexpensive precaution, for routine cleaning where no LBP chips or dust are present, though no scientific data currently exist to verify the manufacturer's advertising claims. If HEPA vacuum equipment is available, its periodic use for normal cleaning is strongly recommended.

Caution: Any cleaning or housekeeping activity that generates visible dust from chipping-flaking of known lead-based paint should be stopped immediately.

If lead-contaminated dust or debris are present, use Work Practice *WP1 - Cleaning Damaged or Deteriorated Surfaces* or *WP2 - Removing Paint Chips and Debris* to clean the areas.

Cleaning floors

Recommended:

- damp or wet mopping
- standard "sponge" or "string" type mops and mild detergent
- standard vacuum cleaners with increased efficiency vacuum cleaner bags if no visible dust or debris from LBP is present

Avoid:

- mops with a "scrubber" strip attached
- powered buffing or polishing equipment
- vacuums with "beater bars" that may abrade the painted surface

Cleaning carpets and rugs

Recommended:

- "wet scrubbing" methods to remove stains
- steam cleaning methods
- standard vacuum cleaners with increased efficiency vacuum cleaner bags if no visible dust or debris from LBP is present

Avoid:

- dry sweeping of surface dust and debris
- shaking or "beating" of carpets and rugs

Cleaning walls

Recommended:

- wet wipe wall completely with non-abrasive cloth
- mild detergents

Avoid:

- steel wool, scouring pads and granular cleaners
- solvents that may dissolve paint

Cleaning other LBP surfaces:

Recommended:

- non-abrasive cloths and mild detergents

Avoid:

- granular cleaners and scouring pads
- solvent cleaners that may dissolve the paint
- excessive rubbing of spots to remove them

Dusting

Recommended:

- normal, non-abrasive dusting cloths or "dusters"

Recordkeeping All documents related to the operations and maintenance of lead-based paint in buildings should be maintained by the owner. These surveys include, but are not limited to: lead-based paint; lead testing laboratory reports; and records of O&M work that has altered, enclosed, or removed lead-based paint.

Building owners should keep employee records of workers assigned to specific lead-based paint O&M work. This

includes O&M worker training and lead-based paint hazard awareness training. Certain records, such as air monitoring data and medical surveillance results, must be kept by the employer for specified periods of time, and these records should be maintained as outlined in the OSHA Lead Standards (*see Chapter 4*).

Waste manifests, if covered by regulation, must be kept for three years.

Waste Disposal

Waste generated during O&M work may be regulated as hazardous waste under the Resource Conservation and Recovery Act (RCRA) and under state and/or local regulations. Hazardous waste requirements under RCRA and state/local regulations describe the procedures necessary to ensure that waste handling and disposal will not adversely impact the environment.

Homeowners who generate lead-based paint containing waste and debris from their own home are exempt from RCRA requirements. Non-homeowners (such as businesses, contractors or owners working on leased residences) who generate lead-based paint containing waste during O&M (or construction) operations on residences or commercial properties are subject to RCRA requirements if they produce 220 pounds or more of such waste in a

month, or store 2200 pounds or more of it at a single site.

In all cases, managers/landlords, businesses, and contractors involved with O&M practices in residential, public, or commercial structures should verify disposal requirements with the appropriate state and local agencies. At a minimum, even non-hazardous waste should be handled or contained in a manner to prevent the spread of dust and debris outside work areas. Careful handling of painted items, such as wood trim, can prevent the spread of lead-contaminated dust and debris. Polyethylene bags are good for containing dust and small size debris. Larger building components with flaking and chipping paint should be wrapped and sealed in plastic.

Written LBP O&M Plan (Site Specific)

This section is the introduction to a sample O&M plan. The work practices and other data would be included in the actual plan. Using the computer disk provided with this Manual, insert the information requested inside the parentheses. After completing the entire section, print the document and insert it into your O&M Manual.

This lead-based paint operations and maintenance program has been prepared to provide guidance for *(insert facility name)*. It includes specific work practices to be followed when working on surfaces containing lead-based paint.

(Name and job title of designated person), who is the Designated Person for the Lead O&M program, can be contacted at *(address, telephone number)*. *(He or she)* can answer questions regarding the O&M program and furnish appropriate work practices for all operations involving lead-based paint.

Painted surfaces at *(facility name)* have been surveyed for lead-based paint by *(name of consultant or in-house inspector)*. The survey results are attached to this O&M program.

Lead-based paint has been identified at the following locations:

(Insert a narrative description of the locations, or construction or as-built documents showing the locations. Also include a description of the condition of the LBP surfaces.)

Lead-based paint has not been specifically identified in the following locations, but is assumed to be present. Painted surfaces in these locations should be treated as lead-based paint until further testing:

(Insert a list of assumed locations. If all locations have been tested and none are assumed positive, this section may be deleted.)

The following individuals have been trained in lead-based paint O&M work procedures and are authorized to perform O&M activities under the direction of the designated person. Training records for these individuals are located at the back of this document.

(Insert the names of trained personnel.)

Work Practices and General Work Procedures have been designed to minimize the creation of dust during maintenance activities on lead-painted surfaces. These work practices are provided as a section of this document.

OSHA Lead in Construction Standard

OSHA's Lead Exposure in Construction Standard, Title 29 of the Code of Federal Regulations, Part 1926, Section 62 [29 CFR 1926.62] went into effect June 3, 1993. The standard contains employee protection requirements for construction workers exposed to lead. The standard applies to renovation, maintenance, alteration, and repair work, including painting and decorating, and maintenance operations associated with the standard's construction activities. It does not include routine cleaning and repainting (e.g., minor surface preparation and repainting of rental apartments between tenants or at scheduled intervals) where there is insignificant damage, wear or corrosion of existing lead-containing paint and coatings or substrates, which are covered by OSHA's general industry standard for lead (29 CFR 1910.1025; see *page 53* of this chapter).

Some states have their own occupational safety and health plans. State regulations may be more stringent and may apply to more activities than the federal standard. It is advisable to check with the state where the work is to be performed before initiating work.

Caution: It is strongly recommended that users obtain a copy and strictly adhere to the OSHA standard. While this *Manual* refers to or describes some federal and state laws and regulations, it is not intended to supersede or supplement any law or regulation or to identify all laws and regulations applicable to lead-based paint in homes and buildings. The statutes, regulations, and guidance documents from all levels of government are evolving rapidly. Users of this *Manual* are advised to obtain and follow applicable requirements. The National Institute of Building Sciences does not assume

responsibility for the currency of referenced documents, requirements, or other provisions included or identified in the *Manual*.

OSHA's lead standard sets limits for the amount of lead in the air and in the blood of exposed workers. Certain actions must be taken in work areas where these limits have been exceeded. The **Permissible Exposure Limit (PEL)** is the highest amount of lead in air to which employees may be exposed.

The **Action Level (AL)** is an amount of lead in air at or above which employers must perform certain actions in addition to those they perform for any work involving occupational exposure of employees to lead. The following limits are set by the standard:

- **AL** = 30 micrograms (μg) of lead per cubic meter (m^3) ($30 \mu\text{g}/\text{m}^3$) of air
- **PEL** = 50 micrograms of lead per cubic meter ($50 \mu\text{g}/\text{m}^3$) of air*

* For shifts greater than 8 hours in any work day use: $\text{PEL} = 400 \div \text{number of hours worked in a day}$.

Exposure Assessment

Employers must determine if any of their employees are exposed to lead at or above the Action Level. One method is to collect air samples from the worker's breathing zone and have

them analyzed by a laboratory. The samples should represent the worker's regular, daily exposure to lead. The samples should be taken for the full work shift. At least one sample for each job classification in each work area must be obtained. The results should be compared to the PEL and AL. The workers' exposure is the exposure that would occur if they were not wearing respirators.

When lead is present, some work tasks generate high levels of lead. OSHA has identified a group of "lead related tasks" that are presumed to generate lead levels in excess of the PELs, and that require interim protection until air monitoring determines the actual lead exposures. Until then, employers must provide workers with respirators, protective clothing, equipment, change areas, hand washing facilities, biological monitoring and training required for an assumed level for these tasks. When the actual level of exposure for the job has been measured, the requirements for that level of exposure can be used. In addition, if an employer has reason to believe a worker's exposure in a job not listed by OSHA may be above the PEL, that employee must be protected as required for exposures above the PEL until monitoring is performed. The "lead related tasks" are listed below in three groups with their assumed lead levels.

Figure 1: Lead-Related Tasks

Employers must assume an exposure over 50 and up to 500 $\mu\text{g}/\text{m}^3$ for the following tasks:

- manual demolition of structures (e.g., dry wall)
- dry manual scraping
- dry manual sanding
- using a heat gun
- power tool cleaning with dust collection systems
- spray painting with lead-based paint

Employers must assume exposure over 500 and up to 2500 $\mu\text{g}/\text{m}^3$ for the following tasks:

- using lead containing mortar
- burning lead
- rivet busting on lead paint
- power tool cleaning without dust collection systems
- clean up activities where dry expendable abrasives are used
- abrasive blasting enclosure movement and removal

Employers must assume exposure over 2,500 $\mu\text{g}/\text{m}^3$ for the following tasks:

- abrasive blasting
- cutting
- welding
- torch burning

In certain cases, the employer may use existing air monitoring results, instead of taking new air samples, to make the initial determination of whether the worker's exposure exceeds the PEL or AL. The existing results must be personal air samples that are less than 12 months old. The work that was monitored must closely resemble the processes, material types, control methods, work practices, and environmental conditions of the current operation. The sampling and analytical methods used must meet the standards' technical accuracy requirements. Air monitoring results meeting these requirements are known as "historical data."

If the initial air monitoring shows that employee exposure is below the Action Level, further air monitoring is not required unless there is a change in equipment, processes, controls or personnel, or a new task is added that may result in new or additional exposures to lead.

If the initial air monitoring shows that employee exposure is at or above the AL, but at or below the PEL, the employer must perform additional air monitoring every 6 months. The air monitoring must continue until two consecutive measurements, taken at least 7 days apart, are below the AL. The air monitoring can then be stopped.

If the initial air monitoring shows that employee exposure is above the PEL, the employer must repeat the air monitoring quarterly. The air monitoring must continue until two consecutive measurements, taken at least 7 days apart, are at or below the PEL. If the results are at or above the AL then air monitoring must continue every 6 months. If the results are below the AL, then no further air monitoring is required unless changes occur that may result in new or additional exposures to lead.

Employees must be notified in writing of the results of their air monitoring. This report must be given within 5 working days after completion of the exposure assessment. Employees must also be told in writing when their exposure is at or above the PEL. This notice must include what actions are being taken to reduce lead exposures below the PEL. Employees also have the right to observe the air monitoring.

The following table summarizes the requirements of 29 CFR 1926.62 for specific exposure levels.

TABLE 1

For Specific Air Lead Levels					During Assessment of Lead Related Tasks
Regardless of Level	At or above AL (30 µg/m ³)		Above PEL (50 µg/m ³)	Above 4 X PEL (200 µg/m ³)	
	1 - 30 Days	> 30 Days			
1926.62(d) - Exposure Assessment and Interim Protection	1926.62(d)(4) - Monitoring Representative of Exposure for Each Exposed Employee	1926.62(j)(1)(ii) - Medical Surveillance Program	1926.62(e) - Engineering and Work Practice Controls	1926.62(g)(2) - Clean Protective Clothing Daily	1926.62(f) - Appropriate Respiratory Protection
1926.62(h) - Housekeeping	1926.62(i)(1)(i) - Initial Medical Surveillance	1926.62(i)(3) - Medical Exams and Consultation (if required)	1926.62(f) - Respiratory Protection		1926.62(g) - Protective Clothing and Equipment
1926.62(i)(5) - Handwashing Facilities	1926.62(i)(2)(ii) - Follow-up Blood Sampling		1926.62(g) - Protective Clothing and Equipment		1926.62(i)(2) - Change Areas
1926.62(l)(1)(i) - Hazcom Training Program	1926.62(k) - Temporary Removal due to Elevated Blood Lead		1926.62(i) - Hygiene Facilities and Practices		1926.62(i)(5) - Handwashing Facilities
	1926.62(l)(1)-(ii)-(iv) - Information and Training		1926.62(m) - Signs		1926.62(j)(1)(i) - Biological Monitoring
					1926.62(i)(2)(iii) - Respirator Training
					1926.21 - Safety Training and Education

Compliance Program The employer must implement a written "compliance program" before starting a job where employees may be exposed to lead above the PEL. Employers must first identify engineering and work practice controls to reduce and maintain employee exposures to lead at or below the PEL. The written program must include:

1. Descriptions of activities that produce lead exposures.
2. Descriptions of the specific means to be used to reduce exposure; where engineering controls are used, the plans and studies used to determine the methods selected.
3. A detailed schedule for implementing the compliance program.
4. A report of the technology considered in meeting the PEL.
5. Air monitoring data that documents the source of the lead exposure.
6. Specific work practice procedures to be used on the project.
7. A schedule of administrative controls, if these are to be used.
8. A description of all arrangements on multi-employer work sites to inform affected employers about the lead project.

The compliance program should also include information on inspections of the job site by a competent person, updating of the program at least every 6 months, and the availability of the plan to affected employees, their representatives, and appropriate enforcement agencies. A competent person is one who is capable of identifying existing and predictable lead hazards and who has authority to take prompt corrective measures to eliminate them.

Respiratory Protection

Respirators are required for employees in the following situations:

1. When an employee's exposure exceeds the PEL.
2. Whenever an employee requests a respirator.
3. As an interim protection for employees performing one of the "lead-related task."

Employers must have a written respiratory protection program in accordance with 29 CFR 1910.134. The lead standard includes a table specifying which respirators should be used when exposures are above the PEL or when performing one of the "lead-related tasks." Any air-purifying respirator used for lead work must be equipped with high efficiency particulate air (HEPA) filter cartridges. Employers should refer to this table before writing a lead-related respiratory protection program. See the discussion of respiratory protection program requirements, including types of respirators used, *OSHA Respiratory Protection Standards*, on page 56. See also *Figure 1 - Lead-Related Tasks* on page 44.

Protective Work Clothing and Equipment

Employers must provide protective clothing to employees:

1. When an employee's exposure exceeds the PEL.
2. When employees are exposed to lead or other compounds that may irritate the skin and eyes.
3. When an employee is performing any of the "lead-related tasks."

Protective clothing must be appropriate for the work, for example:

1. Coveralls or full body work clothes.
2. Gloves, hats, and shoes or disposable shoe coverlets.
3. Face shields, vented goggles, or other eye and face protection.

Clean, dry protective clothing must be given weekly to employees exposed above the PEL and up to $200 \mu\text{g}/\text{m}^3$. Protective clothing must be provided daily if employees are exposed to lead above $200 \mu\text{g}/\text{m}^3$. The employer is responsible for the following items related to protective clothing and equipment:

1. Provide for cleaning, laundering, and disposal.
2. Repair or replace as needed to maintain effectiveness.
3. Ensure that all clothing is removed at the end of the work shift in the designated change area.
4. Ensure that any contaminated protective clothing to be cleaned, laundered, or disposed of is placed in a closed container in the change area. The container should prevent the spread of lead outside the container.

5. Inform in writing anyone who cleans or launders the protective clothing or equipment of the potentially harmful effects of exposure to lead.
6. Ensure that containers of contaminated protective clothing or equipment are labelled as follows:

Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with applicable local, state, or federal regulations.

7. Prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means that disperses lead to the air.

Housekeeping The following housekeeping procedures must be followed on all jobs where employees are covered under this standard:

1. Maintain surfaces as free of lead and lead-contaminated dust as is practical.
2. Clean surfaces with a vacuum equipped with HEPA filters, or other methods that minimize the likelihood of lead becoming airborne.
3. Shoveling, dry or wet sweeping, and brushing can be used only where vacuuming or other equally effective methods have

-
- been tried and found not to be effective.
4. Compressed air must not be used to remove lead from any surface unless it is used in conjunction with a ventilation system that captures the airborne dust created by the compressed air.

Hygiene Facilities Food, beverages, and tobacco products may not be present, used, or consumed, and cosmetics may not be applied in areas where employees are exposed to lead above the PEL.

The employer must provide the following when workers are exposed to lead above the PEL or are doing any of the "lead-related tasks":

1. Change areas (above PEL or lead-related tasks).
2. Showers, if feasible (above PEL).
3. Clean eating areas (above PEL).

In addition, hand washing facilities, which are required at any exposure level, must be provided in accordance with 29 CFR 1926.51(f).

Medical Surveillance and Medical Removal Protection

Employers shall make initial medical surveillance available to any employee exposed at or above the action level on any day. This initial surveillance must include sampling for blood lead and zinc protoporphyrin levels. Employers must also provide biological monitoring for all employees performing lead-related tasks presumed to create employee exposures above the PEL. A medical surveillance program must be provided for employees exposed at or above the action level for

more than 30 days in any consecutive 12 months. This program will include biological monitoring and medical examinations and consultations. Blood sampling and analysis for lead and zinc protoporphyrin must be made available:

- at least every 2 months for the first 6 months and every 6 months thereafter, for employees exposed at or above the Action Level (AL) for more than 30 days in any consecutive 12 months
- at least every 2 months when blood lead level is at or above 40 µg/dl, and for employees exposed above the AL. Testing should continue at this rate until 2 consecutive blood sample results are below 40 µg/dl
- at least monthly during a period when an employee has been removed from work because of high blood lead levels
- if an employee's blood sample results exceed the criterion level for removal, another blood sampling test should be provided within 2 weeks

Medical exams and consultations must be made available on the following schedule:

- at least annually for an employee whose blood lead level was 40 µg/dl or greater in the last 12 months
- as soon as possible for any employee who has developed signs and symptoms commonly associated with lead poisoning or who desires medical advice concerning the effects of current or past exposure to lead on the ability to have a healthy child
- as soon as possible upon learning an employee is pregnant
- as soon as possible after an employee has shown difficulty in breathing during a respirator fit test or use
- as medically appropriate for each employee removed from lead exposure due to a risk of sustaining material impairment to health

Employers must remove employees with lead exposure at or above the Action Level each time:

- a periodic and follow up blood sampling test indicates a blood lead level at or above 50 µg/dl; or
- a final medical determination indicates a detected medical condition that increases health risks from lead exposure

A doctor may make a final medical determination to remove an employee from working with lead. The doctor is not to reveal any findings, lab results, or diagnosis unrelated to occupational exposure to lead to the employer. An employee exposed to lead at or above the Action Level must be removed from lead work, if the employee has a blood lead

level at or above 50 µg/dl on two separate testings, two weeks apart. An employee can return to lead work when his or her blood lead level result is at or below 40 µg/dl on two consecutive testings or a doctor has made a medical determination that the employee can return to lead work. The employer must provide wages and benefits for any employee removed from lead work for up to 18 months, or as long as the job exists.

The employer may not provide "prophylactic chelation." Prophylactic chelation is the routine use of chelating (binding) or similar acting drugs to prevent elevated blood levels in workers who are occupationally exposed to lead, or the use of these drugs to routinely lower blood lead to levels believed to be safe. Chelating drugs should not be used as a substitute for engineering controls, appropriate work practices, and proper personal protective equipment.

Employee Information and Training

Employers must provide hazard communication training for all employees exposed to lead at any level before they start their job assignment.

For employees exposed **below the Action Level**, basic training is required, including instruction in:

- the hazards of lead
- warning signs, labels, and material safety data sheets (MSDSs)
- the requirements of the OSHA lead in construction standard

For employees exposed to lead **at or above the Action Level** on any day, a broader training program must be provided initially and at least annually afterward. The same training must also be provided initially to any employees subject to exposure to lead compounds that could irritate the skin or eyes. The training program for these employees must include:

- the basic training topics listed above
- the contents of the lead in construction standard and its appendices
- the nature of tasks that could lead to exposures at or above the Action Level
- the purpose, proper selection, fitting, use, and limitations of respirators
- the purpose and description of the medical surveillance program and medical removal program
- the engineering and work practice controls associated with an employee's job assignment(s)
- the contents of the employer's written compliance program
- instructions to employees prohibiting use of chelating agents except under medical supervision and removal from

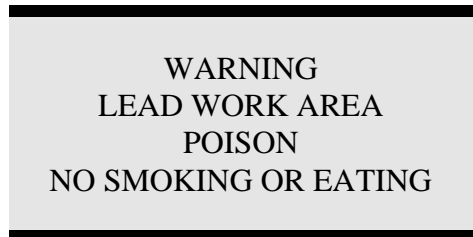
lead exposure

- the right of employees to access their exposure and medical records

For employees performing work in any of OSHA's "lead related tasks," as described above, or where an employer has reason to believe that the exposure is above the PEL, and until the employer performs an exposure assessment that documents that employee exposure is below the PEL, the employer shall train the employees in:

- the basic training topics listed above
- the purpose, proper selection, fitting, use, and limitations of respirators
- safety issues related to the work

Signs Employers must post the following readily visible warning signs in areas where employees' exposure is above the PEL:



Recordkeeping Employers shall establish and maintain records with the following information:

Exposure assessment data, including name, social security number, and job classification of the employee who was monitored and of all other employees whose exposure the sampling is intended to represent; the date, number, duration of sampling, location, result(s), description of the sampling procedure, analytical methods used and evidence of their accuracy, type of respirator worn (if any), and the environmental factors that could affect the sampling results.

- training done for employees
- records of each employee subject to medical surveillance
- cases of medical removals
- objective data for exemption from requirement of initial monitoring

29 CFR 1910.20(d)(1)(i) and 29 CFR 1926.33 require that medical records must be maintained for 30 years past the end of employment. Air monitoring records must be maintained for 30 years.

Training records must be maintained for 1 year past the end of employment. All records are to be available upon request to the OSHA Administrator, the Director of the National Institute for Occupational Safety and Health (NIOSH), affected employees, former employees or their designated representatives for examination and copying. If the employer goes out of business and there is no successor, records are to be transferred to the NIOSH Director. Contact NIOSH prior to transferring any records for instructions and specific requirements.

Do not send any employee records to OSHA or NIOSH without first contacting the Agency.

O&M Requirements Covered by the OSHA General Industry Lead Standard

Much of OSHA's general industry standard (29 CFR 1910.1025) is similar to the construction industry standard discussed above. The major differences between the two standards, and some of their common elements, are discussed here.

The general industry standard applies to custodial operations, such as cleaning and vacuuming, when they are done in work not related to construction operations. It also includes routine cleaning and repainting (e.g., minor surface preparation and repainting of rental apartments between tenants or at scheduled intervals) where there is insignificant damage, wear or corrosion of existing lead-containing paint and coatings or substrates. Employees performing maintenance activities not associated with construction work are covered by the general industry standard for lead. Maintenance activities covered by the general industry standard are those that involve making or keeping a structure, fixture, or foundation in proper condition in a routine, scheduled, or anticipated fashion.

Permissible Exposure Limit and Action Level For both standards, the PEL and Action Level are $50 \mu\text{g}/\text{m}^3$ and $30 \mu\text{g}/\text{m}^3$, respectively, for an 8-hour time-weighted average.

Exposure Assessment For the construction standard, certain identified tasks are presumed to have exposures above (and, in some cases, significantly above) the PEL. Personal protective measures must be used while doing an

initial exposure assessment of these tasks.

The general industry standard does not identify tasks for special consideration. The choice of protective measures is based on exposure monitoring of the operation.

Respiratory Protection

Respiratory protection is not required under either standard when the exposure assessment shows that lead levels are at or below the PEL. However, both standards require that respirators be provided to employees who request them.

Controls and Hygiene For both standards, a new exposure assessment must be done when controls, equipment, or tasks are changed in a way that may result in additional employee exposures at or above the Action Level or above the PEL. Hand washing facilities must be provided for employees exposed to lead at any level.

For the construction standard, when showers are not feasible, employees must wash their hands and face at the end of each work shift. Vacuums used in construction housekeeping must have High Efficiency Particulate Air (HEPA) filters which are used and emptied in a manner that minimizes the reentry of lead into the workplace.

For the general industry standard, vacuums used in housekeeping must be used and emptied in a manner that minimizes the reentry of lead into the workplace. While HEPA vacuums are not mentioned in the general industry standard, they are the only vacuums specified by OSHA (in the construction standard) as minimizing the reentry of lead-contaminated dust. When HEPA vacuuming is not needed or practical, wet methods should be used for dust control. Shoveling and dry sweeping or brushing of lead accumulations is not recommended.

Medical Surveillance and

Examination For both standards, a medical surveillance program must be implemented for all employees who are or who may be exposed to lead above the AL for more than 30 days in a consecutive 12-month period (not necessarily a calendar year). The employer must make a medical examination available to these employees when they notify the employer that they have health signs or symptoms commonly associated with lead, want medical advice on lead and reproduction, or have difficulty breathing with a respirator, or when they are medically removed from or limited in work. This medical examination must include pregnancy testing or laboratory evaluation of male fertility upon employee request.

For the construction standard, initial blood sampling and analysis (biological monitoring) is required for employees performing identified tasks or exposed to lead at or above the AL on any day. The employer must also make a medical examination available to an employee who is or who may be exposed to lead above the AL for more than 30 days in a consecutive 12-month period, and who notifies the employer that she is pregnant.

For the general industry standard, an initial examination is required before workers are assigned to a job involving exposure to lead above the AL.

Training Both standards specify basic initial training for employees exposed to lead at any level. Comprehensive training is required initially and annually thereafter for workers exposed at or above the AL. In addition, the construction standard requires expanded training for all employees performing identified tasks until air sampling shows the actual exposure.

OSHA Hazard Communication Standards

The Hazard Communication Standards (29 CFR 1910.1200 and 1926.59) apply to all employers in general industry and in the construction industry, respectively. Their purpose is to inform workers of health risks associated with exposure to hazardous chemicals in the workplace. The standards require labelling of hazardous chemicals, providing information about chemicals (Material Safety Data Sheets), and training of employees.

An employer must establish a hazard communication program for hazardous chemicals to include:

- 1. Hazard Determination** Chemical manufacturers and importers must evaluate the chemicals they produce or import to determine if they are hazardous. Other employers may rely on the evaluation performed by the manufacturer or importer, or perform their own hazard determination.
- 2. Written Hazard Communication Program** Employers must develop, implement, and maintain at the workplace, a written hazard communication program. The program must describe how labeling, Material Safety Data Sheet (MSDS), and employee training requirements will be met, address non-routine tasks and unlabeled pipes, and provide for notifying other employers whose employees may be exposed to the hazardous chemicals.
- 3. Warning Labels** Employers must ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the identity of the hazardous chemical(s) and appropriate hazard warnings.
- 4. Material Safety Data Sheets (MSDS)** Employers must have an MSDS for each hazardous chemical they use. The MSDS should be provided by the chemical manufacturer or importer and contain at least the basic information described in the Hazard Communication Standard.
- 5. Employee Information and Training** Employers must provide their employees with information and training on hazardous chemicals in their work area. This training must be provided at the time of their initial assignment and whenever a new hazard is introduced into their work area.
- 6. Chemical Inventory** Employers must maintain a current inventory of hazardous chemicals in the workplace. A written chemical inventory is usually maintained with the MSDSs.

OSHA Respiratory Protection Standards

The OSHA Lead in Construction standard (29 CFR 1926.62), General Industry Lead standard (1910.1025), General Industry Respiratory standard (1910.134) and the Construction Industry Respiratory standard (1926.103) require employers to provide employees with proper respiratory protection. Respiratory protection must be used until it can be determined that employees will not be exposed to lead-contaminated dust above the PEL.

Of the two types of respirators, air-supplying and air-purifying (filtering), the latter is usually used on lead-based paint O&M projects. The air-purifying respirator filters the contaminants in the air as it is breathed. Any air-purifying respirator used for lead work must be equipped with high efficiency particulate air (HEPA) filter cartridges.

A half-face (half-mask) respirator with HEPA filters is the minimum respirator required for lead-contaminated dust exposures above the PEL. A full-face (full-facepiece) respirator with HEPA filters is required if the airborne lead particles cause eye or skin irritation at the concentrations occurring during the work, and may be used whenever a half-face respirator is allowed for lead work, such as if it may increase work efficiency. An employer shall provide a powered, air-purifying respirator with HEPA filters in place of a half-face respirator whenever it will provide adequate protection to the employee, and the employee chooses to use it.

A respiratory protection program is also

required that includes, at a minimum:

- written standard operating procedures regarding the selection and use of respirators.
- respirator selection based on the hazards to which workers are exposed. Respirators must provide adequate respiratory protection against the particular hazard for which they are designed.
- a training program in the proper use and limitations of respirators.
- fit testing of respirators.
- cleaning and disinfection of respirators on a regular basis.
- convenient, clean, and sanitary storage of respirators.
- routine inspection during respirator cleaning.
- appropriate surveillance of work area conditions and degree of worker exposure or stress.
- regular evaluation of the continued effectiveness of the program.
- assurance that workers assigned to tasks requiring respirators are physically able to perform the work and to use the equipment. OSHA recommends an annual review of the medical status of a worker who uses a respirator.

EPA Regulations and Guidelines Governing Lead-Based Paint Activities

Disposal of Lead-Based Paint Waste As of early 1995, lead abatement wastes may be either hazardous or non-hazardous under the Resource Conservation and Recovery Act (RCRA). Nearly all states are authorized to implement and administer the basic RCRA hazardous waste program. Generators should always contact state authorities for specific guidance on what constitutes a hazardous waste and specific requirements for disposing of abatement waste.

In making the determination of what constitutes hazardous waste, generators must use their knowledge or waste analysis data to determine whether the waste they have generated exhibits the "Toxicity Characteristic." The toxicity is measured using the EPA's Toxicity Characteristic Leaching Procedure (TCLP). For lead abatement wastes, the regulatory threshold of most concern is for lead; TCLP levels at or above 5 ppm lead define the waste as hazardous.

Exemptions:

Household Wastes Wastes that are generated as part of "interim controls" or as operation and maintenance for lead paint may be exempt from hazardous waste regulations under the exclusion for household waste. The household waste exemption is relatively narrow (and applies to wastes from "routine maintenance"), and is not generally applicable to the renovation and demolition activities common in lead abatement. Generators should contact state RCRA authorities to determine the limitations of this exclusion. See also,

Current Regulatory Activities on page 59 for further information.

Small Quantity Wastes If less than 100 kg/month (about 220 lbs.) of hazardous waste is produced, generators qualify as "conditionally exempt small quantity generators." The waste may then be handled as nonhazardous. Certain limitations apply and some states do not have this exemption.

Abatement Waste Categories EPA encourages generators to segregate abatement wastes in order to minimize the volume of hazardous waste and reduce the testing needed. While the kinds of wastes generated will depend on abatement methods used, most wastes can be separated into one of several categories:

Low-Lead Waste These wastes include filtered wash water, disposable clothing after vacuuming, and cleaned plastic sheeting. These wastes typically pass the TCLP test and are not hazardous.

Architectural Components This category includes painted building components, such as doors, trim, windows, baseboards, soffits, railings, molding, radiators, and stone or brick. Current regulations require the generator to use testing results or "knowledge" of their waste to identify hazardous waste.

Various site-specific factors may affect whether the waste would be hazardous (age of building, thickness of paint, sampling protocol). Therefore, generators should contact state authorities for information on lead abatement wastes in their area, and whether architectural components are usually considered nonhazardous waste.

Concentrated Lead Waste These wastes include lead paint chips and dust; sludge from paint stripping; uncleaned rags, mops, and scrapers; and HEPA vacuum filters. These wastes typically fail the TCLP test and should be handled as hazardous (unless conditionally exempt as small quantity generator).

Other Wastes Other wastes usually should be tested to determine if they are hazardous, and managed appropriately. The most important waste in this category is contaminated soil. While TCLP results for soils are difficult to predict, anecdotal experience suggests that soil lead that exceeds 5,000 ppm will likely fail the TCLP test. Excavated soil that fails the test should be handled as hazardous. The EPA is currently working on a comprehensive approach to deal with contaminated media. The EPA has recommended actions for various soil levels, which are dependent upon factors such as accessibility to children.

Current Regulatory Activities

Title X, the Residential Lead-Based Paint Hazard Reduction Act of 1992, amends the Toxic Substance Control Act (TSCA), Title IV, Lead Exposure Reduction, and contains all the EPA mandates for the regulation of LBP activities as defined by the Title. Under Section 402(a)(1) of TSCA, EPA is

developing new disposal standards for LBP waste.

As of early 1995, the current intent of EPA is to defer temporarily the regulation of architectural components from RCRA to the TSCA regulation, where no RCRA requirements would apply (e.g., TCLP testing, transport requirements, etc). The TSCA regulations would mandate no co-disposal of LBP architectural components with municipal or other acidic/putrescible industrial wastes. This would likely lead to the disposal of components in construction and demolition landfills, which do not accept municipal waste. Generators are urged to contact state or local authorities in their area for the current status of the disposal of architectural components from LBP activities.

Title X also amended the Lead-Based Paint Poisoning Prevention Act requiring HUD to issue new regulations concerning the evaluation and reduction of lead-based paint hazards in federally assisted housing as well as federally owned housing. These regulations are currently being developed.

1995 HUD Guidelines This document, *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, provides detailed, comprehensive, and technical information on how to identify lead-based paint hazards in housing and how to control such hazards safely and

efficiently. The guidelines are being issued pursuant to Section 1017 of Title X for the conduct of federally supported work involving risk assessments, inspections, interim controls, and abatement of lead-based paint hazards. These guidelines are not regulations. For purposes of this Manual, the Guidelines may be useful for anyone who is interested in further information on lead hazards posed by paint, dust, and soil even though the housing or building may have no connection with the federal government.

Lead in Paint, Dust, and Soil in Homes

Title X, the Residential Lead Based Paint Hazard Reduction Act of 1992, in amending TSCA at Section 403, requires that EPA develop health-based standards for paint, dust, and soil. Although final standards have not been issued, EPA has issued Interim Guidelines. The Guidelines outline sampling procedures and action levels for lead in paint, dust, and soil.

Coatings of residential paint are defined by EPA to be lead-based if the lead content exceeds either 1.0 mg/cm² or 0.5% by weight. In certain circumstances the LBP must be either abated or addressed through interim controls. Until either the HUD Guidelines are published in final form or the final Section 402 standards are issued, abatement activities should be performed according to the 1990 Interim HUD Guidelines and interim control activities should be conducted according to state and local requirements since they are not addressed in the 1990 Interim HUD Guidelines.

Where abatement or interim control activities have been performed, EPA recommends (as of early 1995) that the

following clearance levels be met:

Location	Clearance Level
Uncarpeted Floors	100 µg/ft ²
Interior Window Sills	500 µg/ft ²
Window Troughs	800 µg/ft ²

The 1990 HUD interim guidance document, while addressing lead in soil at Comprehensive Environmental Response Compensation and Liability Act (CERCLA) sites and Resource, Conservation, and Recovery Act (RCRA) facilities, recommends a threshold level of 400 ppm in bare soil for residential land use. This threshold applies in areas expected to be used by children, including residential backyards, day care and school yards, playgrounds, public parks, and any other areas where children gather. See *Disposal of Lead-Based Paint Waste on page 57*.

Proposed Requirements for Lead-Based Paint Activities

In 1994, the EPA proposed a regulation under Title IV of TSCA designed to establish a comprehensive, national program for training, certifying, and accrediting individuals and firms who perform lead-based paint activities. The proposed regulation would also establish standards for conducting those activities. The final version of the regulation will serve as the basis for EPA approval of state programs.

The proposed regulation covers four categories of buildings/structures, each with its own requirements:

Target Housing, which is defined by Title IV as "any housing constructed prior to 1978," with certain limited exceptions.

Public Buildings, which the proposed regulation defines as "any building constructed prior to 1978...which is generally open to the public or occupied or visited by children." The proposed examples include schools, day care centers, museums, airport terminals, hospitals, stores, restaurants, office buildings, and government buildings.

Commercial Buildings, which the proposed regulation defines as "any building used primarily for commercial or industrial activity, which is generally not open to the public, or occupied or visited by children." Proposed examples include warehouses, factories, and garages.

Superstructures, which the proposed regulation defines as any "large steel or other industrial structure." Proposed examples include bridges and water towers.

Training, Accreditation, and Certification EPA proposed that persons performing certain activities in one of the categories of buildings and structures, above, be trained and certified by an accredited training provider in courses specific to that type of building or structure. The proposed regulation requires that firms engaged in these activities be able to certify that they use only certified employees for such jobs.

Target Housing and Public Building	Training Hours
Lead abatement worker	32
Supervisor	40
Inspector/Risk Assessor	40
Inspector/Technician	24
Planner/Project Designer	56

Commercial Buildings and Superstructures	Training Hours
Lead worker	32
Supervisor	32

Conducting Lead-Based Paint Activities The proposed regulation also specifies in detail how the following activities are to be conducted in the four building/structure categories:

Target Housing
 Inspection
 Risk Assessment
 Abatement

Public Buildings
 Identification of Lead-Based Paint
 Risk Assessment
 Abatement
 Demolition

Commercial Buildings and Superstructures
 Identification of Lead-Based Paint
 Deleading
 Demolition

Users should note that existing state and local rules and regulations may be more stringent than the proposed EPA regulation and should contact state and local agencies for guidance.

General Procedure Structure

Three general procedures are described in *this chapter* of the Manual. Sixteen work practices are described in *Chapter 6*. The general procedures and work practices were designed to be used hand-in-hand. Both were structured around the three levels of dust generation defined on the next page. As the expected level of lead-contaminated dust generation increases, so does the level of precaution used to prepare and clean up work areas and to protect workers and occupants during performance of the work practice.

Performance of any one of the 16 work practices requires use of one of the three general procedures. In other words, the general procedures are necessary no matter which work practice is being performed. "Icon" symbols were developed to represent six parts of the general procedure structure. The format for the general procedures includes the following:

Tools & Supplies

Preparation of Work Area involving



Personal Protection

The "icon" represents a worker with full protection, i.e., protective clothing, respirator, etc.



Dust Control measures

The "icon" represents a plastic drop cloth.



Access

The "icon" represents a doorway with barricade tape limiting entry by non-workers.

Clean-up of Work Area involving



Clean Work Surfaces

Clean Dust Control surfaces

The "icon" represents a mop and bucket.



Worker Hygiene and

The "icon" represents a soap dispenser and spigot.



Disposal

The "icon" represents a sealed plastic bag containing lead-paint debris and cleaning materials.

Work Practice Levels

The guidance in this Manual is structured around three levels of anticipated dust generation. The three levels were established by a project committee following the rules of the NIBS consensus process. The definitions of the three levels are as follows:



Level 1 A negligible amount of lead-contaminated dust may be generated, requiring a minimal amount of preparation and worker protection. Negligible may be non-visible or barely visible and localized.



Level 2 A moderate amount of lead-contaminated dust and debris will be generated or disturbed, but neither the quantities nor the duration of effort warrant full-scale work area preparation and worker protection. A moderate amount is clearly visible, may contain debris and paint chips, but will not spread beyond a small area drop cloth to any other surface in the room.



Level 3 Lead-contaminated dust and debris will be generated or disturbed in sufficient quantities and for enough time to warrant full-scale work area preparation and worker protection. A significant amount is an amount that cannot be contained simply by the use of a small area drop cloth.

"Icon" symbols are also shown with each of the three level definitions. The Manual incorporates these symbols whenever guidance is presented at one of the three levels.

The Level 1 "icon" represents a loose plastic drop cloth. The Level 2 symbol is a protective foot covering referred to as a "bootie." The Level 3 "icon" represents a respirator.



General Procedures ■ Level 1

Work Practices using Level 1 General Procedures are those activities requiring a minimal amount of preparation and worker protection because a negligible amount of lead dust may be generated or disturbed. This amount of lead dust may be non-visible or barely visible and localized. However, small paint particles, chips and debris may result from any disturbance of a painted surface. These preparation and cleanup procedures were designed to protect workers and work areas from lead-based paint dust and debris and to aid in the cleaning of any dust or debris created as a result of the work practice.

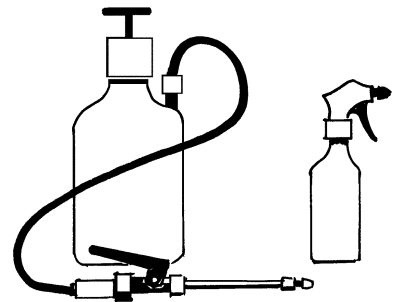
The following is a list of tools, equipment and supplies that are referenced in the work practices and are recommended to perform the work practices. For frequent O&M work, it might be helpful to maintain an "O&M cart" containing the necessary tools, equipment and materials.

Tools

- Garden sprayer or mister

Supplies

- Plastic drop cloth
- Bucket with clean water
- Sponges
- Detergent (lead-specific cleaning agent* preferred)
- Clean cloths
- Paper towels
- Plastic disposal bags
- Duct tape



- * High-phosphate detergents, those which contain at least 5% tri-sodium phosphate (TSP), have been restricted by some states because of concern about their impact on the environment. Other detergents without phosphates have been developed specifically for lead clean up and can be used.

Personal Protective Equipment

- Disposable gloves
- Safety glasses



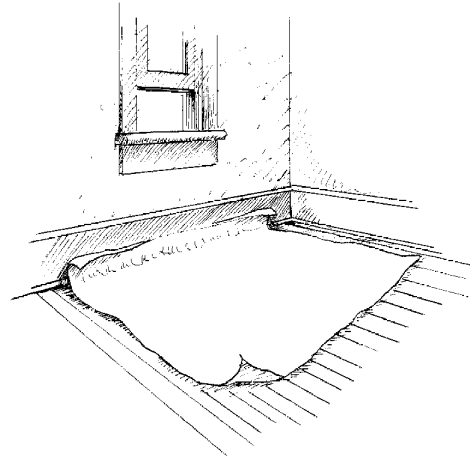
Preparation ■ Level 1



Dust Control

Place a plastic drop cloth on the floor under the immediate work area. The drop cloth should be large enough to catch any lead dust released.

It is preferable, but not essential, to secure the drop cloth to adjacent walls.



Access

No one should be allowed on the drop cloth who is not involved in performing the work.



Personal Protection

The primary objective is to work as cleanly as possible. If any dust or debris gets off the drop cloth, the work should immediately be upgraded to Level 2.

Proceed to Work Practice Performance Instructions.



Clean Up ■ Level 1



Cleaning Work Area

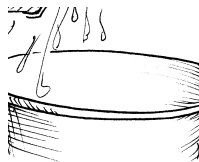
Cleaning Solution:

Follow the manufacturer's instructions to mix the cleaning solution. Keep the cleaning solution in a labeled container until used for wet wiping or wet mopping.

Wiping Work Area:

These procedures are intended to remove dust and debris from the work area following completion of the task.

Put on disposable gloves. Pour cleaning solution onto a cloth or paper towel. Wring excess solution into bucket. Wipe work area with wet towel. If more than one paper towel is needed, dispose of the first towel and use a second one for the next section.



Rinse Bucket

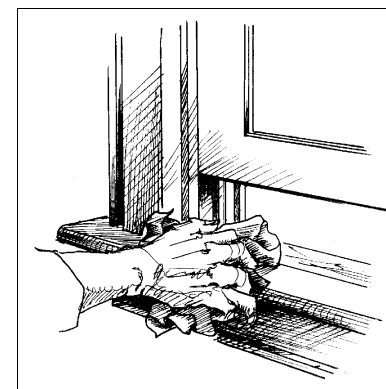


Dirty Bucket

Wet another towel with the clean water in the bucket. Wring out excess water.

Rinse the work surface with the wet towel. If more than one paper towel is needed, dispose of the first paper towel and use a second one for the next section.

Wipe off the drop cloth and tools using the same procedures. Fold up drop cloth for future use.



Clean Up ■ Level 1



Disposal

Place all waste in a disposal bag and seal the bag.

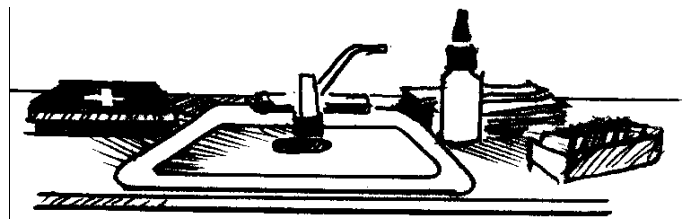
Waste generated during O&M work may be regulated as a hazardous waste as described under the Resource Conservation and Recovery Act (RCRA). In addition, individual State and/or local regulations must be complied with. Hazardous waste requirements under RCRA and other state/local regulations describe the necessary treatment of the waste to ensure that its handling and disposal will not adversely impact the environment.

Individual homeowners who generate lead-based paint (LBP) containing waste/debris are exempt from RCRA requirements. However, non-homeowners (e.g., businesses, contractors) who generate LBP containing waste during O&M operations on residences or commercial properties are subject to RCRA requirements. (**Note:** The RCRA does not apply if the generator produces less than 220 pounds during a given month.)



Worker Hygiene

Thoroughly wash face and hands after O&M work activities. Do not eat, drink, smoke, or apply cosmetics before washing, or while in the area during the O&M work procedure.



** Hygiene station contains First-Aid Kit, Running Water, Soap, and Eye-Wash Station.*





General Procedures ■ Level 2

Work Practices using Level 2 General Procedures are activities producing moderate amounts of dust and debris. A moderate amount of dust and debris is clearly visible, and may contain debris and paint chips, but will not spread beyond a small area drop cloth to any other surface in the room. These quantities do not require full scale site preparation, or worker protection. Preparation and clean-up procedures were designed to protect workers and work areas from lead-based paint dust and debris and to aid in clean-up of any dust and debris that is created.

The following is a list of tools, equipment and supplies that are referenced in the work practices and are recommended to perform the work practices. For frequent O&M work, it might be helpful to maintain an "O&M cart" containing the necessary tools, equipment and materials.

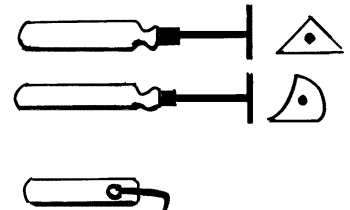
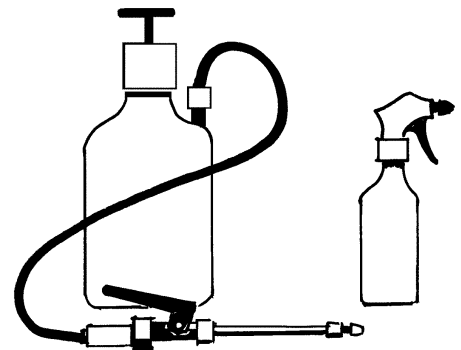
Tools

- Garden sprayer or mister
- Putty knife or paint scraper
- Utility knife

Supplies

- Plastic drop cloth
- Tape
- Mop and mop bucket
- 2 Buckets with clean water
- Sponges
- Clean cloths
- Paper towels
- Plastic disposal bags
- Detergent (lead-specific cleaning agent* preferred)

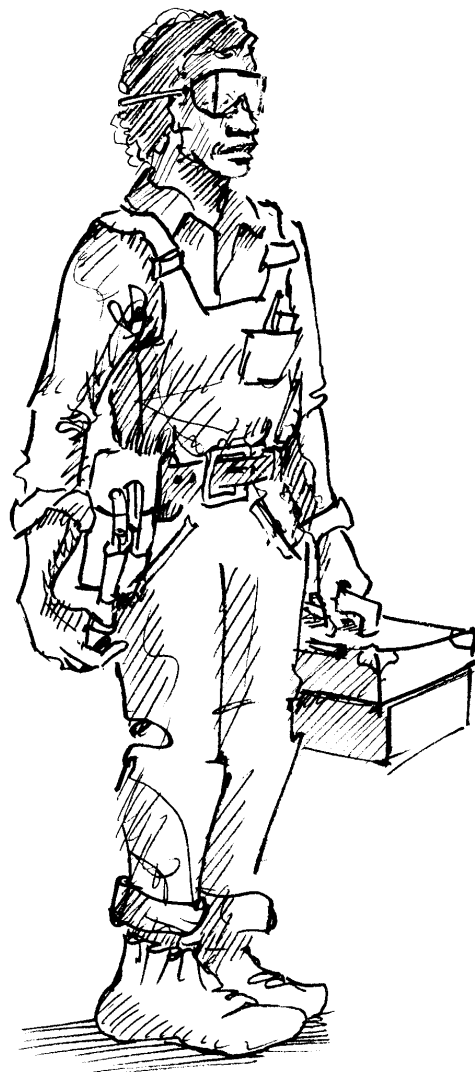
- * High-phosphate detergents, those which contain at least 5% tri-sodium phosphate (TSP), have been restricted by some states because of concern about their impact on the environment. Other detergents without phosphates have been developed specifically for lead clean up and may prove to be effective.



General Procedures ■ Level 2

Personal Protective Equipment

- Disposable shoe coverings
- Disposable gloves
- Safety glasses



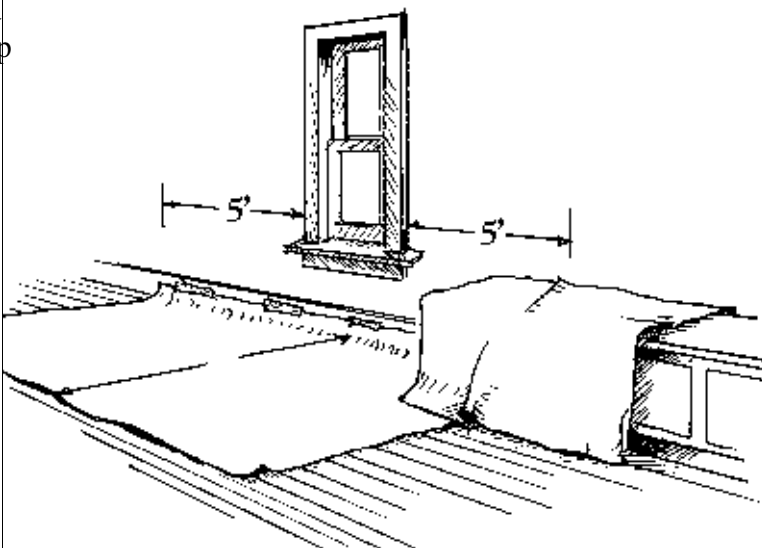
Preparation ■ Level 2



Dust Control

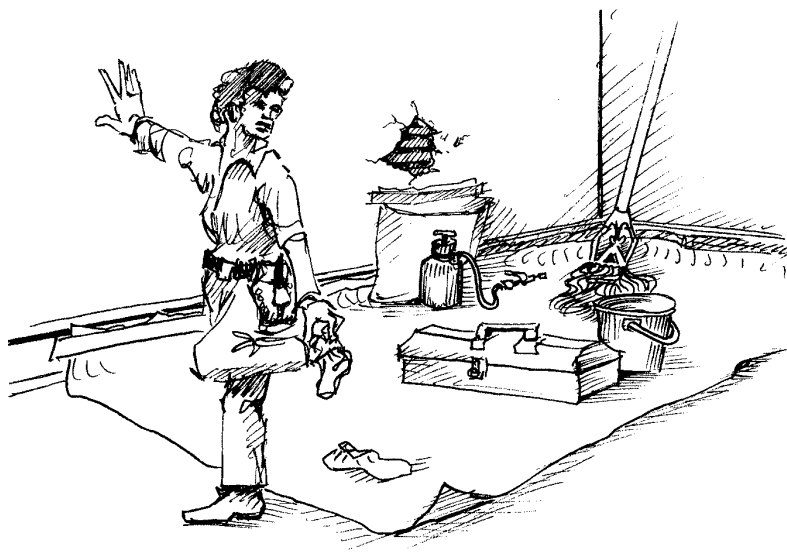
Move furnishings and equipment away from area of work. Place plastic drop cloth over fixed-in-place equipment or furnishings.

Place plastic drop cloth on floor under area of work extending five (5) feet from all areas of work on lead-based paint. Lap and seal additional drop cloths as necessary. Turn drop cloth up baseboard of wall within the work area and seal to wall with tape.



Personal Protection

Disposable gloves and shoe coverings are recommended to prevent the spread of LBP dust to other areas. Shoe coverings should be removed when stepping off the plastic drop cloth. Work gloves and goggles should be worn as required for protection during the O&M procedure.

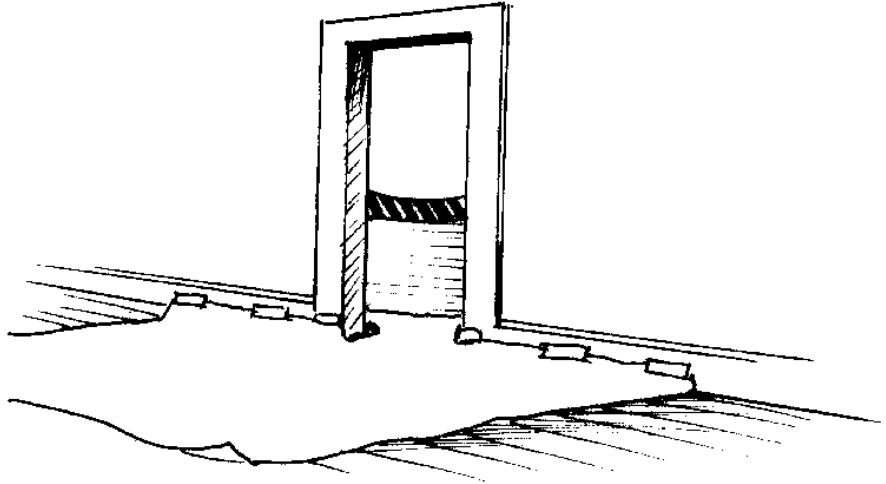


Preparation ■ Level 2



Access

Limit access through the work area to O&M workers. A tape "barricade" may be placed across door openings to help control traffic.



Proceed to Work Practice *Performance* Instructions



Clean Up ■ Level 2

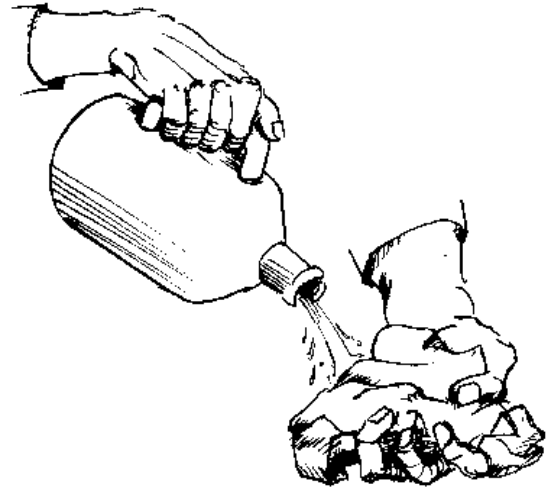


Cleaning Work Area

Wiping Work Area

Cleaning Solution: Follow the manufacturer's instructions to create the cleaning solution. Keep the cleaning solution in a labeled container until used for wet wiping or wet mopping.

Fill two buckets with clean water and place them in the work area with the container of cleaning solution. The buckets should be designated clean rinse, and dirty rinse. If the mop bucket is handy, it may be used as a third dirty wring container.



Cleaning Work Surface: Pour cleaning solution onto a clean cloth. Wring excess solution into the dirty bucket without placing the cloth into the bucket. Wipe the work surface with the cloth. Add more cleaning solution to the cloth and continue wiping until the entire surface area has been covered. Discard all cloths used in this procedure in the disposal bag.



Dirty Rinse



Clean Rinse



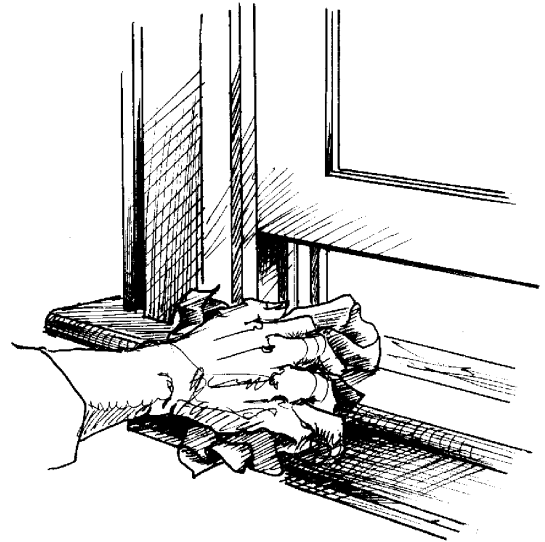
Clean Up ■ Level 2

Rinsing Work Surface: Dip and wring out a clean cloth in the first rinse bucket. Wipe off the work area. Rinse the cloth in the first bucket again and wring out thoroughly. Rinse the cloth in the second bucket and wring out thoroughly again.

Note: Rinse water should be changed periodically, depending on the amount of contamination.

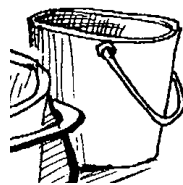
Continue to clean the work surface with the cloth and rinse using this procedure until the entire work surface has been cleaned.

Remove Drop Cloth: Wipe dust off all tools and equipment. Place these cleaned items away from the work area. Use wet paper towels to pick up accumulations of dust or debris. Drop cloth should be rolled inward and placed in disposal bags with other waste.

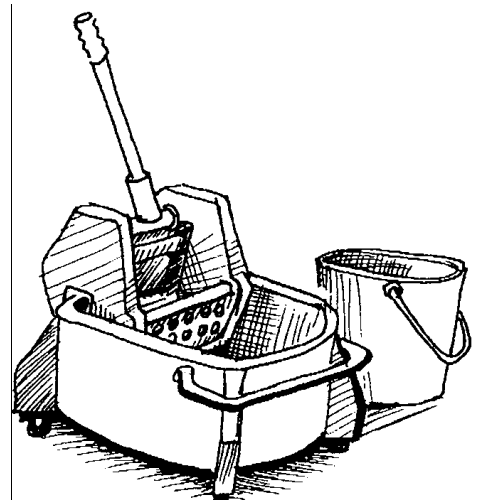


Mopping Work Area

Clean Work Area: Collect any visible debris using wet cloths before mopping the area. Mopping should also be done by the **three-bucket** method. The buckets should be labelled or designated cleaning solution, clean rinse, and dirty rinse (mop bucket), as shown below. Pour cleaning solution into the cleaning bucket. Fill the two rinse buckets with clean water. Follow the sequence of steps below.



Cleaning Solution



Rinse Bucket

One Place the mop into the cleaning solution and wring excess solution into the mop bucket.

Two Mop small sections of the work area until the mop is **Mop Bucket** dry.

Three Slush the mop in the rinse bucket and wring thoroughly.

Four Repeat step One.

Note: The rinse water in the two buckets should be changed periodically, depending on the level of contamination.



Clean Up ■ Level 2

Continue this process until the entire surface has been thoroughly cleaned.

Rinsing Work Area: Rinsing should also be done by the **three-bucket** method except that the cleaning solution is exchanged for a second rinse bucket, as shown below. Fill the two rinse buckets with clean water. Follow the sequence of steps below.

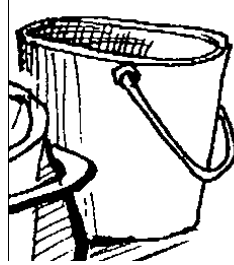
One Place the mop into the clean rinse bucket and wring excess solution into the mop bucket.

Two Mop small sections of the work area until the mop is dry.

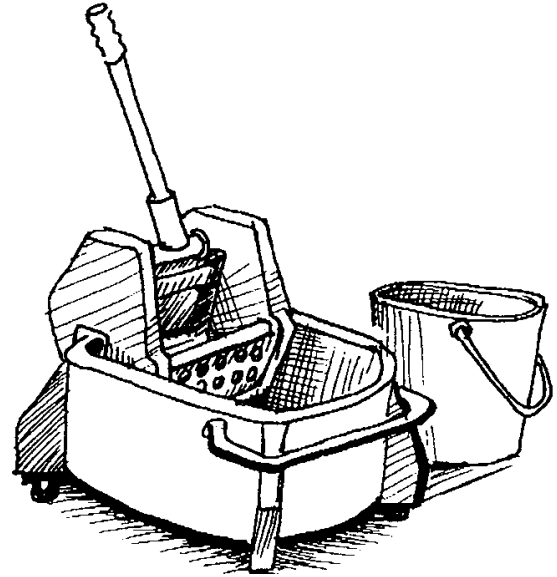
Three Slosh the mop in the dirty rinse bucket and wring thoroughly.

Four Slosh the mop in the clean rinse bucket and wring thoroughly.

Five Repeat step One.



Clean Rinse



Mop Bucket

Dirty Rinse

Note: The rinse water in the two buckets should be changed periodically, depending on the level of contamination.

Continue this process until all areas have been thoroughly rinsed.



Clean Up ■ Level 2



Disposal

Drop cloths should be rolled inward and placed in disposal bags with other waste.

Waste generated during O&M work may be regulated as a hazardous waste as described under the Resource Conservation and Recovery Act (RCRA). In addition, individual State and/or local regulations must be complied with. Hazardous waste requirements under RCRA and other state/local regulations describe the necessary treatment of the waste to ensure that its handling and disposal will not adversely impact the environment.

Individual homeowners who generate lead-based paint (LBP) containing waste/debris are exempt from RCRA requirements. However, non-homeowners (e.g., businesses, contractors) who generate LBP containing waste during O&M operations on residences or commercial properties **are** subject to RCRA requirements. (**Note:** The RCRA **does not** apply if the generator produces less than 220 pounds during a given month.)



Worker Hygiene:

After all work has been completed, thoroughly wash face and hands. Do not eat, drink, smoke, or apply cosmetics in the work area during O&M activities or before washing.

** Hygiene station contains First-Aid Kit, Running Water, Soap, and Eye Wash Station.*





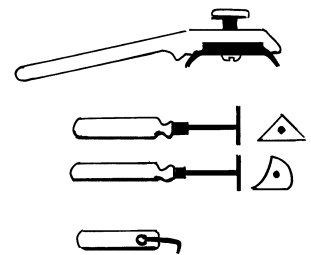
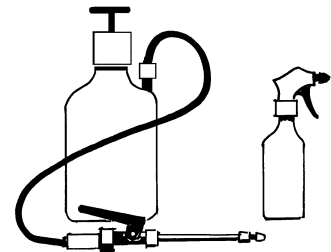
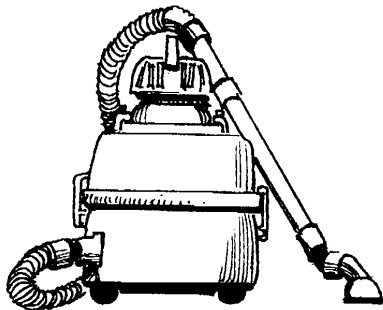
General Procedures ■ Level 3

Work Practices using Level 3 General Procedures are activities that generate substantial quantities of dust and debris. This level of dust and debris cannot be contained in the work area simply by the use of drop cloths or may generate airborne lead levels in excess of the action level established by OSHA (see *Chapter 4*). Full scale site preparation is required to minimize contamination of nearby areas, and worker protection is required to protect health. Cleaning procedures are provided to help remove lead dust and debris before occupants are allowed to return.

The following is a list of tools, equipment, and supplies that are referenced in the work practices and are recommended to perform the work practices. For frequent O&M work, it might be helpful to maintain an "O&M cart" containing the necessary tools, equipment, and materials.

Tools

- Garden sprayer or mister
- Putty knife or paint scraper
- Utility knife
- HEPA vacuum with attachments



Supplies

- Plastic drop cloth
- Tape
- Warning signs
- Warning barrier tape
- Mop and mop bucket
- 2 Buckets with clean water
- Sponges
- Clean cloths
- Paper towels
- Plastic disposal bags
- Detergent (lead-specific cleaning agent* preferred)

* High-phosphate detergents, which contain at least 5% trisodium phosphate (TSP), have been restricted by some states because of concern about their impact on the environment. Other detergents without phosphates have been developed specifically for lead clean up and may prove to be effective.

Personal Protective Equipment

- Respirators equipped with HEPA filters
(or HEPA filters and appropriate vapor cartridges if encountering solvents or petroleum vapors)
- Disposable coveralls
- Disposable shoe coverings
- Disposable gloves
- Safety glasses

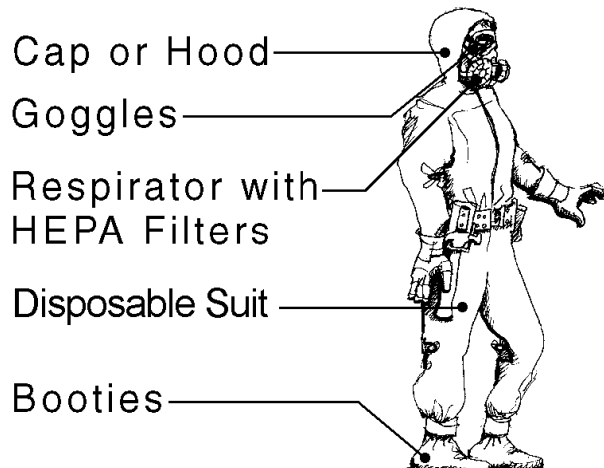


Preparation ■ Level 3



Personal Protection

Respirators, disposable coveralls, or reusable clothing, hoods, shoe covers and gloves are required to protect workers from lead-based paint dust and to keep them from carrying the dust to other areas. The respirator should be at least a half-face negative pressure respirator with high efficiency particulate air (HEPA) filters. The respirator must meet OSHA regulations. The respirator must be fit tested, used, and maintained in accordance with OSHA regulations.



Note: Reusable clothing should be laundered periodically and not taken home.

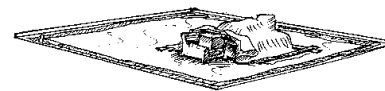
Note: If other hazardous substances are present, workers may need respirators equipped with HEPA filters and other filters. For example, if acetone is also present in high concentrations, respirators should be equipped with combination HEPA filter/organic vapor cartridges.



Dust Control

If possible, move all furnishings and equipment out of the area of work. Place plastic drop cloths over and under fixed-in-place equipment or furnishings to remain in room or work area. Lap and seal covering so that dust and debris cannot become lodged on these items or fall into them.

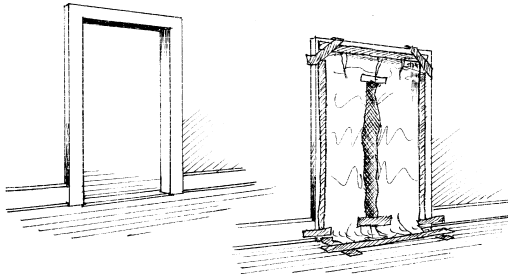
Place plastic drop cloth on floor in room or area of work. Extend plastic ten (10) feet from all areas of work on lead-based paint including any area where paint debris may be thrown by O&M activity. Lap and seal additional drop cloths to make a complete floor area containment. Turn plastic up baseboard of walls within the work area and seal to wall with tape.



Preparation ■ Level 3



Access



The work area must be vacated and secured by means of scheduling, locking, or use of traffic barriers. Overlapped polyethylene "flap" doorways should be installed at the entrance to the work area or room. Only O&M workers should be allowed in the work area. Workers should not leave the established work area wearing protective clothing during or after O&M procedures. Remove all protective clothing carefully to keep dust and debris within the work area.

Proceed to Work Practice
Performance Instructions



Clean Up ■ Level 3

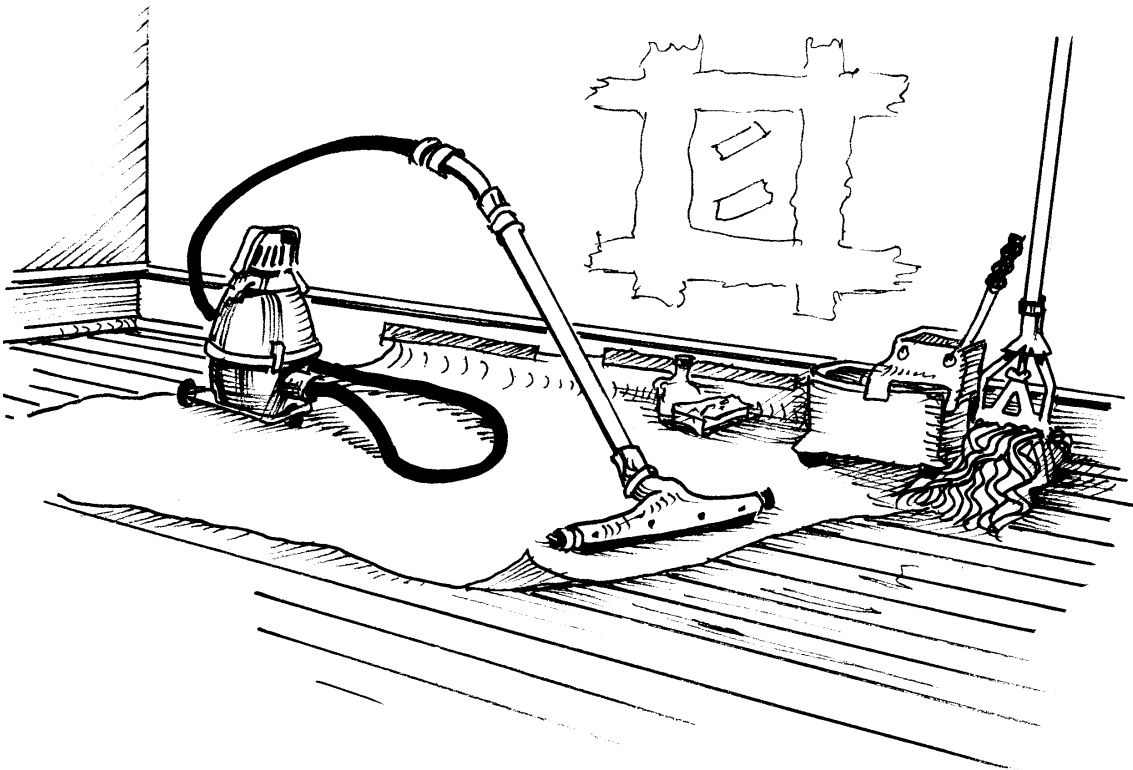
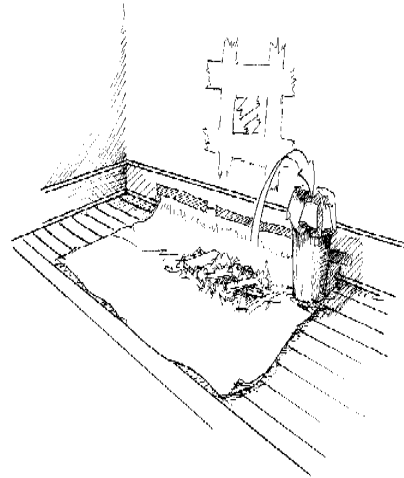


Cleaning Work Area

Debris Removal:

After completing the work, pick up all pieces of debris from the O&M operation using wet cloths and place in 6 mil disposal bag. Place larger items in 6 mil plastic and wrap securely for transport and disposal.

HEPA vacuum the work area and the plastic to remove visible dust and debris.



Clean Up ■ Level 3

Wiping Work Area

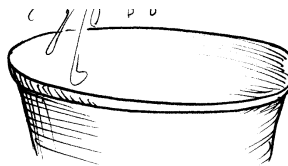
Cleaning Solution: Follow the manufacturer's instructions to create the cleaning solution. Keep the cleaning solution in a labeled container until used for wet wiping or wet mopping.

Fill two buckets with clean water and place them in the work area with the container of cleaning solution. The buckets should be designated clean rinse and dirty rinse. If the mop bucket is handy, it may be used as a dirty bucket for wringing the cloths.

Cleaning Work Surface: Pour cleaning solution onto a clean cloth. Wring excess solution into the dirty bucket without placing the cloth into the bucket. Wipe the work surface with the cloth. Add more cleaning solution to the cloth and continue wiping until the entire surface area has been covered. Discard all cloths used in this procedure in the disposal bag.



Dirty Rinse



Clean Rinse

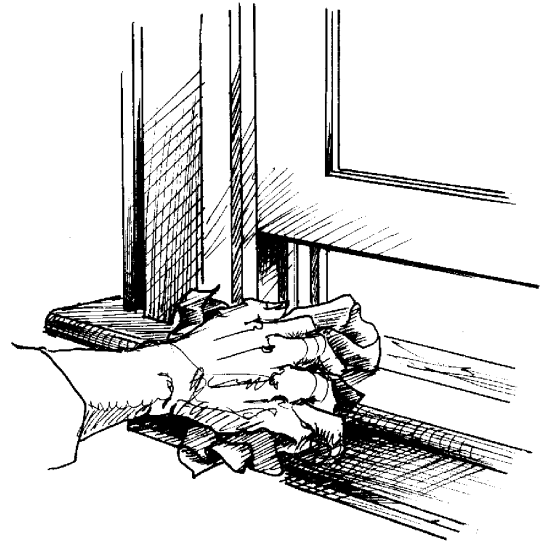


Clean Up ■ Level 3

Rinsing Work Surface: Dip and wring out a clean cloth in the first rinse bucket. Wipe off the work area. Rinse the cloth in the first bucket again and wring out thoroughly. Rinse the cloth in the second bucket and wring out thoroughly again.

Note: Rinse water should be changed periodically, depending on the amount of contamination.

Continue to clean the work surface with the cloth and rinse using this procedure until the entire work surface has been cleaned.

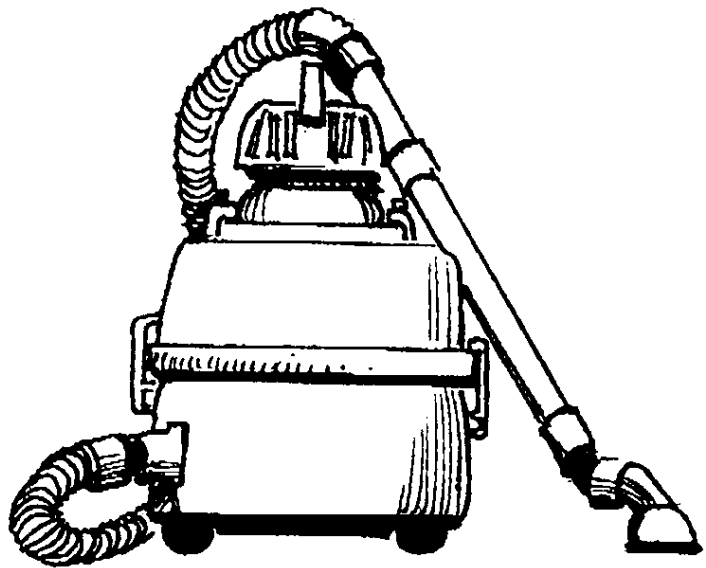


HEPA Vacuuming:

HEPA vacuum the disposable coveralls and shoe coverings to remove any dust. Remove suit, gloves and shoe coverings and place in a disposal bag.

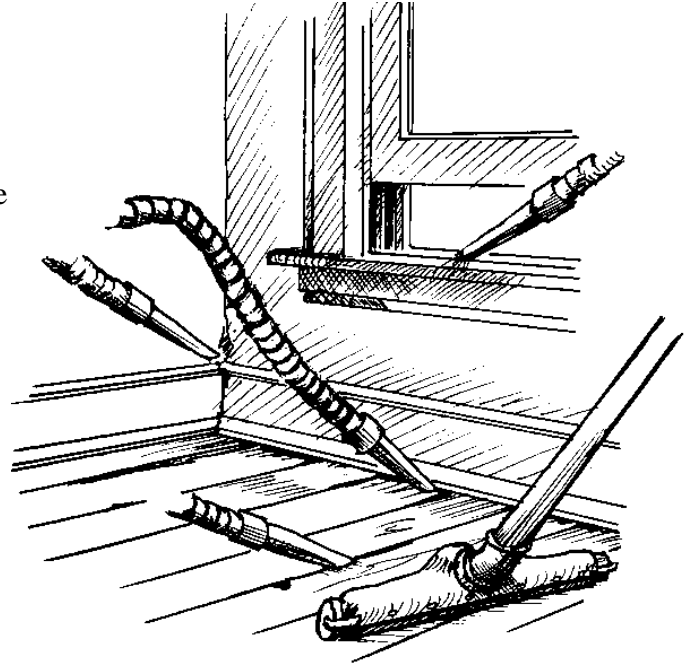
Remove Drop Cloth:

Wipe dust off all tools and equipment. Place these cleaned items away from the work area. Use wet paper towels to pick up accumulations of dust or debris. Remove all "flap" covers from entrances and place them in disposal bags. Drop cloth should be rolled inward and placed in disposal bags with other waste.



Clean Up ■ Level 3

HEPA vacuum the area under the plastic drop cloths as the cloths are removed. Use proper attachments to vacuum areas in corners and along baseboards.



Mopping Work Area

Clean Work Area: Collect any visible debris using wet cloths before mopping the area. Mopping should be done using the **three-bucket** method. The buckets should be labelled or designated cleaning solution, clean rinse, and dirty rinse (mop bucket), as shown below. Pour cleaning solution into the cleaning bucket. Fill the two rinse buckets with clean water. Follow the sequence of steps below.

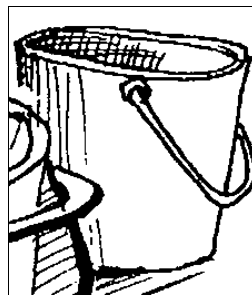
One Place the mop into the cleaning solution and wring excess solution into the mop bucket.

Two Mop small sections of the work area until the mop is dry.

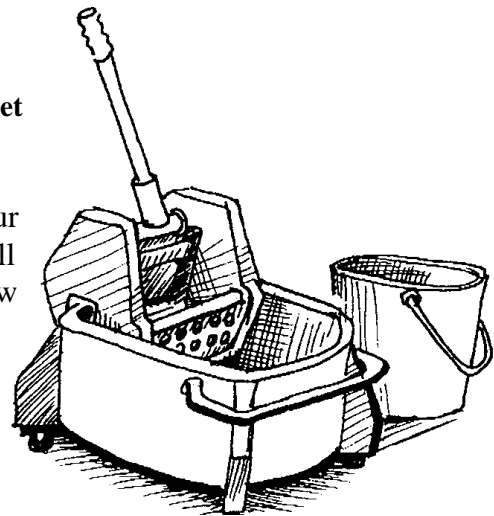
Three Slush the mop in the rinse bucket and wring thoroughly.

Four Repeat step One. Continue this process until the entire surface has been thoroughly cleaned.

Note: The rinse water in the two buckets should be changed periodically, depending on the level of contamination.



**Cleaning
Solution**



Mop Bucket

Rinse Bucket



Clean Up ■ Level 3

Rinsing Work Area: Rinsing should also be done by the **three-bucket** method except that the cleaning solution is exchanged for a second rinse bucket, as shown below. Fill the two rinse buckets with clean water. Follow the sequence of steps below.

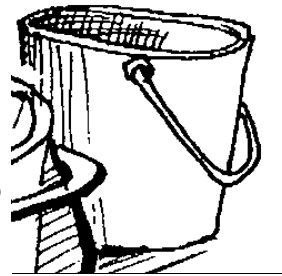
One Place the mop into the clean rinse bucket and wring excess solution into the mop bucket.

Two Mop small sections of the work area until the mop is dry.

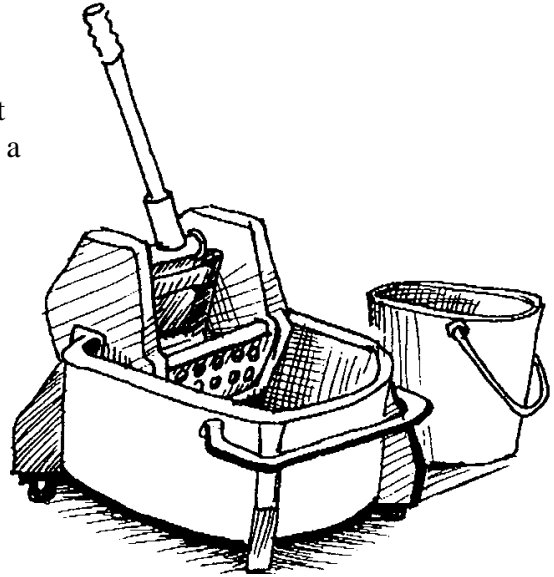
Three Slosh the mop in the dirty rinse bucket and wring thoroughly.

Four Slosh the mop in the clean rinse bucket and wring thoroughly.

Five Repeat step One.



Clean Rinse



Mop Bucket

Dirty Rinse

Note: The rinse water in the two buckets should be changed periodically, depending on the level of contamination.

Continue this process until all areas have been thoroughly rinsed.

Remove all "flap" covers from entrances after the work area has passed a clearance test.

Caution: "Clearance testing" by dust wipes is sometimes desirable after a work activity to validate that the work procedures were properly controlled and that cleanup was successful. See page 33 for a discussion of clearance testing.

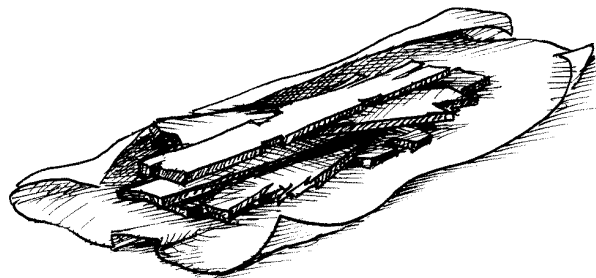


Clean Up ■ Level 3

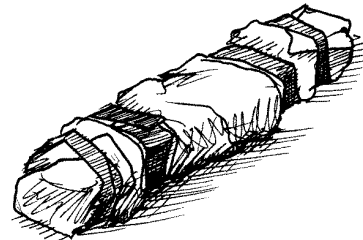


Disposal

Place all debris in disposal bags. Wrap waste which is too large to fit in disposal bags in 6-mil plastic and seal with tape.



Waste generated during O&M work may be regulated as a hazardous waste as described under the Resource Conservation and Recovery Act (RCRA). In addition, individual state and/or local regulations must



be complied with. Hazardous waste requirements under RCRA and other state/local regulations describe the necessary treatment of the waste to ensure that its handling and disposal will not adversely impact the environment.

Individual homeowners who generate lead-based paint (LBP) containing waste/debris are exempt from RCRA requirements. However, non-homeowners (e.g., businesses, contractors) who generate LBP containing waste during O&M operations on residences or commercial properties are subject to RCRA requirements. (**Note:** The RCRA does not apply if the generator produces less than 220 pounds during a given month.)



Clean Up ■ Level 3



Worker Hygiene

HEPA vacuum worker's clothing. Thoroughly wash face and hands. Showering is recommended after Level 3 work. The exterior of respirators should be rinsed while washing or showering. Remove respirators only after rinsing. Do not eat, drink, smoke, or apply cosmetics while in containment area or before washing thoroughly.

** Hygiene station contains First-Aid Kit, Running Water, Soap, and Eye-Wash Station.*



Work Practice Level Summary

	<i>Page #</i>	<i>Level 1</i>	<i>Level 2</i>	<i>Level 3</i>
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WP3 - Removing Small Areas of Paint	97	■	■	■
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Work Practice Structure

Sixteen work practices are described in *this chapter* of the Manual. Three general procedures are described in *Chapter 5*. The work practices and general procedures were designed to be used hand-in-hand. Both were structured around the three levels of dust generation defined on the next page. As the expected level of lead-contaminated dust generation increases, so does the level of precaution used to prepare and clean up work areas and to protect workers and occupants during performance of the work practice.

Performance of any one of the 16 work practices requires use of one of the three general procedures. In other words, the general procedures are necessary no matter which work practice is being performed.

Work Practices There is a five-part format for the work practices that includes Description, Examples, Preparation, Performance, and Clean Up.

The **Description** explains the unique nature or requirements of each work practice.

Work practice **Examples** are provided to help Manual users determine the appropriate level of preparation and protection for specific conditions in their buildings. Examples are not provided at all three levels for every work practice. If no examples are included for one level, it was deemed unlikely to be encountered under typical conditions.

Preparation and **Clean Up** refer users to those same sections of the general work procedures as appropriate.

The **Performance** portion of the work practice provides specific instructions for how to accomplish the O&M task. If Examples are provided for all 3 levels, there will be 3 sets of Performance instructions. A higher performance level may refer back to a lower level. For example, Level 2 may refer to Level 1 where specific tasks were already described in complete detail. This was done to keep the Manual as short as possible.

Work Practice Levels

The guidance in this Manual is structured around three levels of anticipated dust generation. The three levels were established by a project committee following the rules of the NIBS consensus process. The definitions of the three levels are as follows:



Level 1 A negligible amount of lead-contaminated dust may be generated, requiring a minimal amount of preparation and worker protection. Negligible may be non-visible or barely visible and localized.



Level 2 A moderate amount of lead-contaminated dust and debris will be generated or disturbed, but neither the quantities nor the duration of effort warrant full-scale work area preparation and worker protection. A moderate amount is clearly visible, may contain debris and paint chips, but will not spread beyond a small area drop cloth to any other surface in the room.



Level 3 Lead-contaminated dust and debris will be generated or disturbed in sufficient quantities and for enough time to warrant full-scale work area preparation and worker protection. A significant amount is an amount that cannot be contained simply by the use of a small area drop cloth.

"Icon" symbols are shown with each of the three level definitions. The Manual incorporates these symbols whenever guidance is presented at one of the three levels.

The Level 1 "icon" represents a loose plastic drop cloth. The Level 2 symbol is a protective foot covering referred to as a "bootie." The Level 3 "icon" represents a respirator.

General Procedures Performance of any one of the 16 work practices requires use of one of the three general procedures. In other words, the general procedures are necessary no matter which work practice is being performed. "Icon" symbols were developed to represent six parts of the general procedure structure. The format for the general procedures includes the following:

Tools & Supplies

Preparation of Work Area involving



Personal Protection

The "icon" represents a worker with full protection, i.e., protective clothing, respirator, etc.



Dust Control measures

The "icon" represents a plastic drop cloth.



Access

The "icon" represents a doorway with barricade tape limiting entry by non-workers.

Clean-up of Work Area involving



Clean Work Surfaces, Clean Dust Control Surfaces

The "icon" represents a mop and bucket.



Worker Hygiene

The "icon" represents a soap dispenser and spigot.



Disposal

The "icon" represents a sealed plastic bag containing lead-paint debris and cleaning materials.

WP1 ■ Removing Paint Chips and Debris

Description

Lead-based paint chips and debris should be removed from surfaces in preparation for other O&M work and to prevent future contamination of surrounding areas. Wet methods must be used to minimize airborne dust containing lead.

Examples



Level 1

- Removing negligible amounts of lead paint dust or debris from surfaces using tape.
- Removing negligible amounts of lead paint dust or debris from exposed cavities.



Level 2

- Chipping loose paint from flaking surfaces.
- Collecting debris and unattached chips for disposal.
- Removing moderate amounts of lead paint dust or debris from exposed cavities.



Level 3

- Removing debris following unexpected disturbance of lead paint and substrate.
- Vacuuming lead paint debris with HEPA-filtered vacuum.
- Removing significant amounts of lead paint dust or debris from exposed cavities.

Work Practice

Preparation

Use the *General Procedures* level appropriate for the actual level of work. When working on a floor, surround the work area with drop cloths, taping the edges around the work area.

Performance ■ Level 1



Dust and chip removal:

Negligible quantities of lead paint dust and chips can be removed effectively by using strong tape. The tape can be wrapped "tacky" side out around the fingers and the surface tapped lightly until all loose paint fragments adhere to the surface of the tape. The used tape should be placed in a disposal bag.

This approach can be used to remove dust from surfaces and inside exposed cavities prior to cleaning. See *WP2 - Cleaning Damaged or Deteriorated Surfaces* for cleaning procedures.

Performance ■ Level 2



Collecting dust or debris:

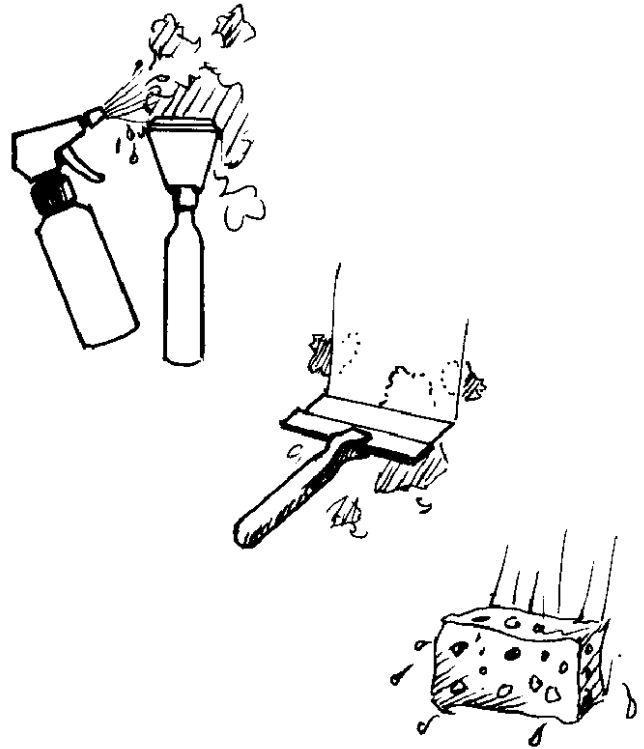
Moderate amounts of lead paint, dust, or debris can be collected from surfaces or exposed cavities using wet cloths. The cloths, with the dust or debris, should be placed in a disposal bag.

As an alternative, LBP dust and debris can be collected using a HEPA vacuum and the surface cleaned using *WP2 - Cleaning Damaged or Deteriorated Surfaces*.

Chipping loose paint:

Mist the work area. Using a putty knife or scraper, carefully scrape loose paint flakes and deteriorated subsurfaces. Carefully chip or wet sand (see *WP4 - Wet Sanding*) all edges until no loose paint remains on the surface. Collect any debris created with wet cloths and place in a disposal bag.

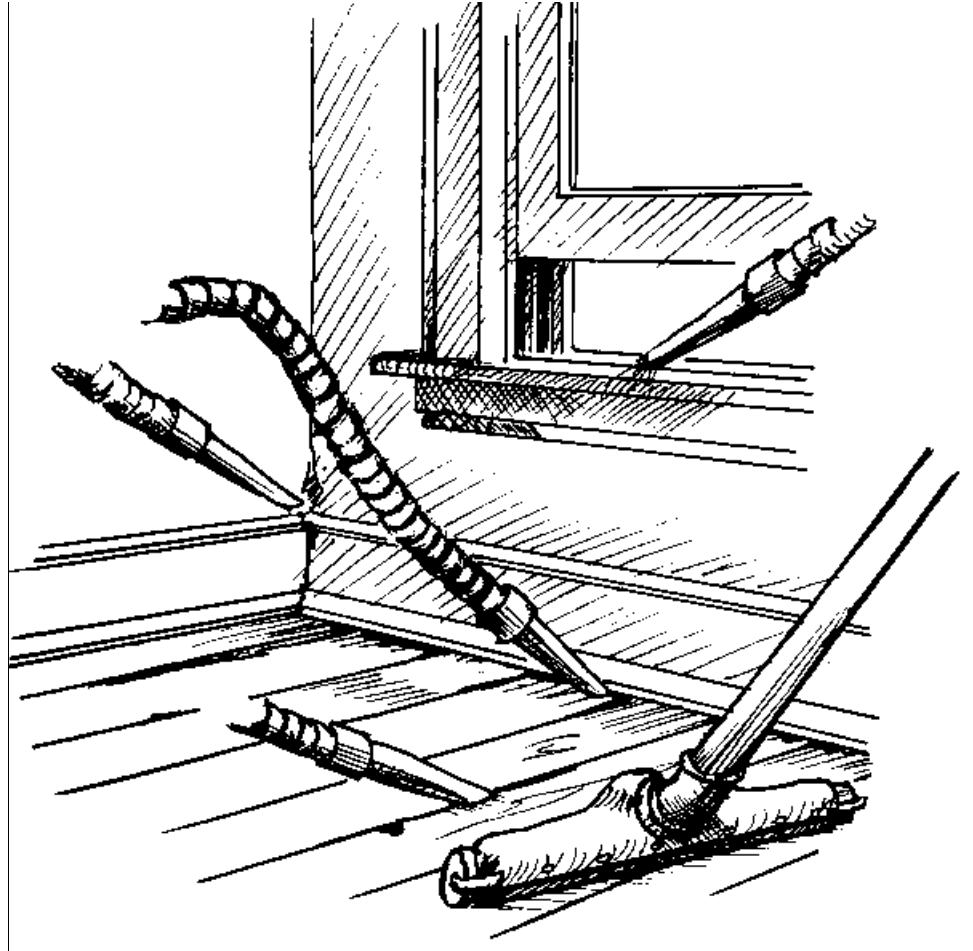
Illustration also shows skim coating a rough surface and smoothing the skim coating with a damp sponge.





Removing debris:

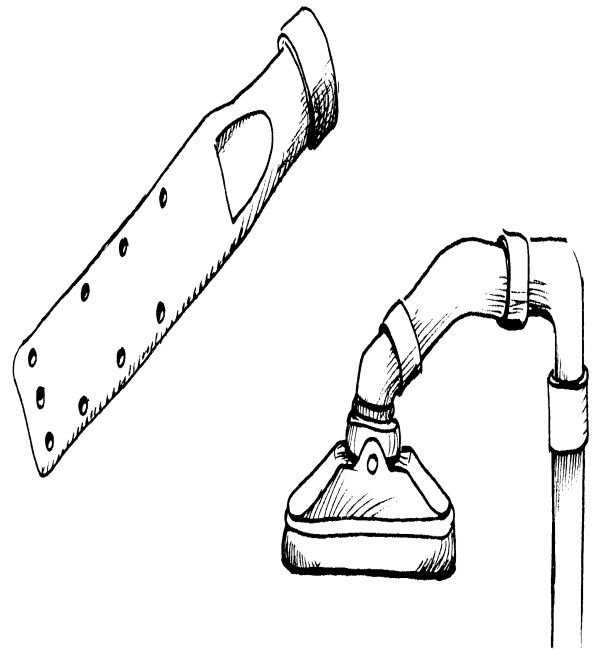
Mist the debris with a cleaning solution during collection to minimize the spread of lead-containing dust. Collect all paint chips and debris using wet methods (sweeping, mopping, wiping). Remove the debris from smaller "sub-areas" of a large surface to prevent building up large piles of lead-containing waste. Place all debris into disposal bags.



HEPA vacuuming:

Areas with large quantities of lead paint dust or debris should be HEPA vacuumed. Use an attachment appropriate for the surface being cleaned. For example, the crevice tool may be used to clean floor cracks, along baseboards, or in corners. Vacuum the entire surface thoroughly, overlapping each pass of the HEPA vacuum. After cleaning the entire surface, complete a second cleaning with a series of passes 90° to the first series.

These two vacuum attachments are for cleaning radiators and high/ hard-to-reach moldings and other surfaces.



Refer to Work Practice *WP14 - Changing Filters and Waste Bags in HEPA Vacuums* for maintenance procedures and for removing lead dust from the vacuum.

Clean-up

Perform clean-up according to the *General Procedures* level corresponding to the actual level of work.

WP2 ■ Cleaning Damaged or Deteriorated Surfaces

Description

When paint surfaces are in good condition and there has been no disturbance, the *recommended housekeeping* procedures described in *Chapters 2 and 3* can be followed. Accessible surfaces with deteriorated or damaged lead-based paint should be cleaned periodically. Surfaces with deteriorated paint will require surface preparation and wet clean-up (wiping or mopping) or HEPA vacuuming. In addition, some surfaces may require an initial cleaning when LBP has been identified.

Examples



Level 2

- Wet cleaning walls with chipped or cracked paint.
- Wet cleaning door and window trim with flaked or chipped paint.
- Mopping floors with chipped or cracked paint.
- Wet wiping window troughs or sills with flaked or chipped paint.
- Initial cleaning where dust or debris are present.



Level 3

- Wet cleaning or mopping surfaces where significant quantities of dust or debris are present.
- HEPA vacuuming surfaces where significant quantities of dust or debris are present.

Work Practice

Preparation:

Use the *General Procedures* level appropriate for the actual level of work.

Performance ■ Level 2



Surface preparation:

If flaking or chipping paint is present, use *WPI - Removing Paint Chips and Debris*, before cleaning the surface.

Cleaning:

Use the *General Procedures - Level 2*, wet wipe or wet mop cleaning procedures, to clean the surface.

Performance ■ Level 3 _____

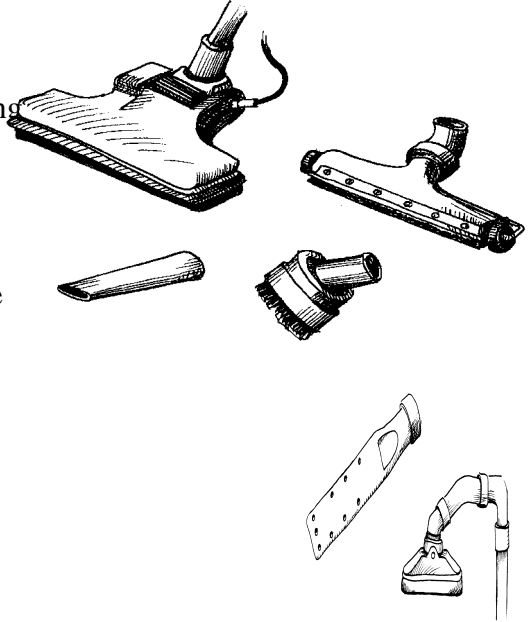


Surface preparation:

If flaking or chipping paint is present, use *WPI - Removing Paint Chips and Debris*, before cleaning the surface.

Cleaning:

Use the *General Procedures - Level 3*, wet cleaning and HEPA vacuuming procedures to clean the surface.



Note: Many different attachments are available for HEPA vacuums, which will allow cleaning most surfaces.

Clean Up:

Follow the *General Procedures* appropriate for the actual level of work.

WP3 ■ Removing Small Areas of Paint

Description

Sometimes small areas of lead-based paint must be removed to prepare the surface for other work. Lead-based paint can be removed from various types of surfaces using several techniques. This work practice includes methods for wet scraping, chemical removal, and mechanical or abrasive paint removal.

Examples



Level 1

- Wet scraping paint removal prior to attaching hardware such as a coat hook, picture hanger, etc. See *WP7 - Attaching to a Lead-Painted Surface*.
- Wet scraping paint removal prior to drilling a small hole. See *WP5 - Penetrating Lead-Based paint*.



Level 2

- Wet scraping paint removal of a moderate size area prior to attaching hardware such as multiple coat hooks, door knobs, etc. See *WP7 - Attaching to a Lead-Painted Surface*.
- Wet scraping paint removal prior to undercutting a door. See *WP5 - Penetrating Lead-Based Paint*.
- Wet scraping paint removal prior to cutting larger holes, such as those needed to pass rigid electrical conduit through a wall. See *WP5 - Penetrating Lead-Based Paint*.



Level 3

- Chemical removal of paint.
- Wet scraping paint removal of larger areas prior to attaching items such as cabinets, etc. See *WP7 - Attaching to a Lead-Painted Surface*.
- Wet scraping paint removal of multiple building components such as window frames prior to painting. See *WP8 - Applying Coatings to Lead-Painted Surfaces*.

Work Practice

Preparation

Use the *General Procedures* level appropriate for the level of work.

Performance ■ Level 1



Hand scrape paint removal:

Mist the area to be scraped. Cut around the area to be removed with a utility knife. Remove the paint to the substrate using a scraper. Collect dust or debris with a wet paper towel. Place all debris in a disposal bag.

Performance ■ Level 2

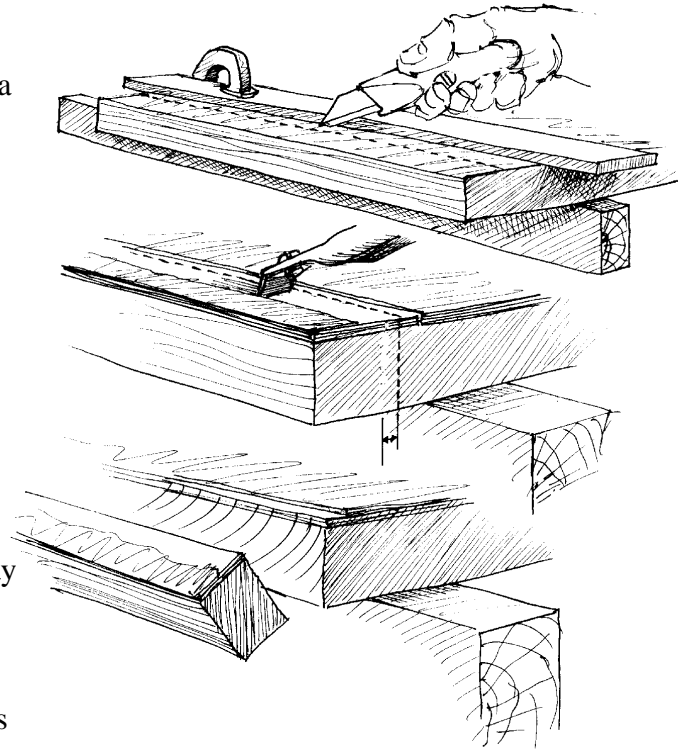


Hand scrape paint removal:

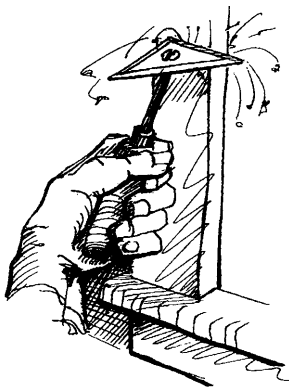
Mist the area to be scraped. Cut around the area to be removed with a utility knife.

Remove the paint from the surface using a knife or scraper. The work area should be misted during this process to minimize airborne dust. Scrape the paint down to the bare substrate using a scraper. Keep the surface wet while scraping. Scrape the edge of the adjacent painted surface until no loose paint remains along the edge. Wet sanding methods (see **WP4 - Wet Sanding**) may also be used to keep the adjacent paint edges from flaking.

Use wet cloths to pick up paint chips and debris. Place cloths with debris in a disposal bag.



* The above example is for paint removal prior to undercutting a door with a power saw.



Caution: Dry methods, such as dry scraping, should never be used to remove lead-based paint.

Performance ■ Level 3



Chemical paint removal:

Follow manufacturer's instructions for chemical application on the paint removal area. Chemical paint removers can be very hazardous and must be used with caution. Collect the chemical residue with the removed paint according to the manufacturer's instructions. Place all waste in a disposal container recommended by the manufacturer.

Some chemical removers require the area to be neutralized using another chemical before cleaning. See manufacturer's instructions for neutralization requirements.

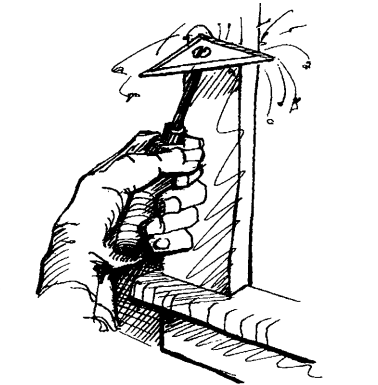
Note: Respirators used during chemical paint removal must be equipped with cartridges that will filter both lead and the vapors associated with the chemical remover or neutralizer. See manufacturer's instruction for respirator cartridge requirements. Chemical removers may be caustic and require the use of gloves for skin protection. See manufacturer's recommendations for specific gloves.

Mechanical or abrasive paint removal:

Drop cloths or plastic sheeting should cover enough area around the work surface to prevent the spread of dust during this procedure.

Mist or wet the work surface sufficiently to keep dust to a minimum. Keep the work surface wet during the entire removal operation.

Caution: Dry scraping methods should never be used to remove lead-based paint.



Pick up visible dust and debris with wet cloths and place in a disposal bag.

Clean-up

HEPA vacuum the work surface and perform the clean-up procedures found in the *General Procedures* level corresponding to the level of work.

WP4 ■ Wet Sanding

Description

Performance of other work practices may direct you to use wet sanding methods as part of surface preparation or to finish a surface after completing other work. This work practice describes how to minimize lead dust while sanding.

Examples



Level 2

- Wet sanding painted wood or metal surfaces.
- Wet sanding painted walls or ceilings.
- Wet sanding cut edges to smooth rough paint edges.

Work Practice

Preparation

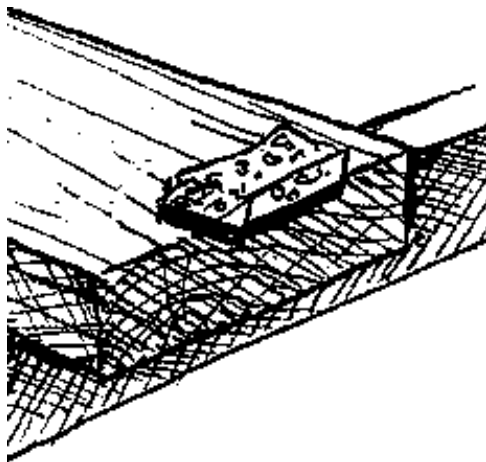
Use the *General Procedures* Level 2.

Performance ■ Level 2



Wet sanding:

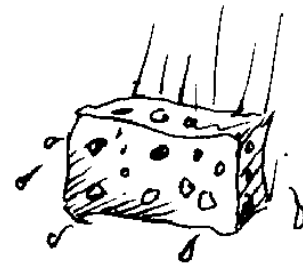
Mist the surface. Remove all loose paint from the surface using damp sandpaper or damp abrasive sponge. Continue misting the work surface during the entire operation. Periodically mist any dust and debris that is created by the sanding process to minimize its spread to other areas. It is important that the surface should remain wet during the entire process.



Wet sand the edges of any paint that will not be removed until no loose paint remains.



Caution: Dry sanding techniques should never be used to remove lead-based paint.



Clean-up:

Perform clean-up according to the *General Procedures* level corresponding to the actual level of work.

WP5 ■ Penetrating Lead-Based Paint

Description

Lead-painted materials can be drilled, sawed, planed, routed, or cut by following these procedures. This Work Practice can also be used when disturbing lead paint by hammering or prying. Before beginning work determine how much material or paint will be disturbed, in order to select the most appropriate level of preparation.

Examples



Level 1

- Drilling small holes, as when attaching a coat hook to a wooden wall.
- Planing painted wood with manual tools.
- Prying open doors, windows and drawers that are sticking due to small areas of paint around the edges.
- Removing electrical switch plate with paint around edges.



Level 2

- Sawing with manual or power tools.
- Undercutting, routing or planing one or two painted wood doors using power tools.
- Prying open doors, windows, and drawers that have been completely painted shut around the edges.
- Drilling larger holes, such as those needed to pass rigid electrical conduit through a wall.



Level 3

- Sawing, routing, or planing multiple painted wood doors using power tools, such as undercutting all the doors in a four-unit apartment building.
- Cutting or grinding concrete painted with LBP.

Work Practice

Preparation:

Use the *General Procedures* level appropriate for the actual level of work.

Performance ■ Level 1



Surface preparation:

Mist the work area. Use a utility knife or scraper to remove any loose paint from the work surface. See *WP3 - Removing Small Areas of Paint*.

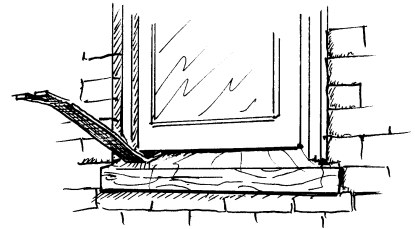
Drilling, sawing, planing:

Drill or plane through the wet surface, being careful to keep all dust and debris on the plastic drop cloth.

Note: LBP dust and debris can lodge in crevices in planes. Care must be taken to clean all dust and debris off the plane after completing the task.

Prying:

For prying jobs, choose the correct tool to fit the task. Pry open object while wet. Place damp cloths under the prying tool to minimize paint damage and debris.



Finishing:

Mist area of paint penetration. Carefully chip away all loose paint fragments with a scraper until no loose paint remains along edges. The edges may be wet sanded (*see WP4 - Wet Sanding*) to smooth them, if needed.

Use wet cloths to collect paint chips and debris. Place all waste in a disposal bag.

Performance ■ Level 2



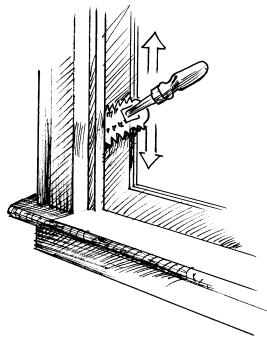
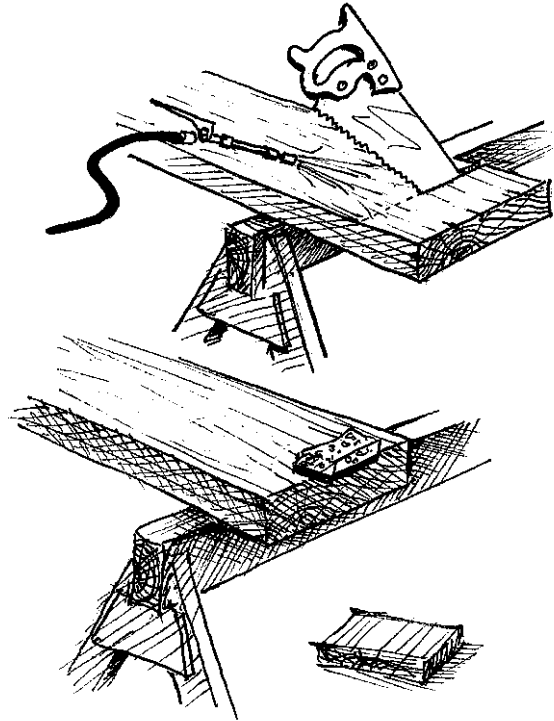
Surface preparation:

Mist the work area. Use a utility knife or scraper to remove any loose paint from the work surface or to slice the painted edges of the component to be removed from the work surface. See *WP3 - Removing Small Areas of Paint* to remove paint along the cutting line prior to undercutting doors.

Warning: Do not mist any power tools. This may result in electrical shock. The use of a ground fault circuit interrupter (GFCI) is recommended.

Sawing, routing, planing, or drilling: Perform the required work on the surface while the surface is wet. Re-wet the surface if needed during work. Turn off power tools during re-wetting and keep water spray off tools. Be careful to keep dust and debris on the drop cloth area. If dust and debris are spreading to the other areas, add more drop cloths, or use Level 3 procedures.

After completing work, disconnect power tools and re-mist the work surface.



Prying: Choose the right type and size tool for the job. Cut along the painted separation lines with a utility knife. Place wet cloths under the prying tool to minimize damage to painted surfaces. Pry open the object while the surface is wet. * *The tool in the illustration to the left is called a window zipper. It is used for unsticking a window that has been painted shut.*

Finishing:

Mist the area of paint penetration. Carefully chip away all loose paint fragments with a scraper until no loose paint remains along edges. The edges may be wet sanded (*see WP4 - Wet Sanding*) to smooth them, if needed.

Use wet cloths to collect paint chips and debris. Place all waste in a disposal bag placed on drop cloth to prevent the spread of LBP dust or debris to other areas.

Performance ■ Level 3



Surface preparation:

Mist the work area. Use a utility knife or scraper to remove any loose paint from the work surface or to slice the painted edges of the component to be removed from the work surface. See *WP3 - Removing Small Areas of Paint*.

Sawing, routing, planing, or drilling:

Follow the *Level 2* procedures. Use a HEPA vacuum to collect chips and debris from the work.

Cutting or grinding concrete:

Wet the concrete before cutting or grinding. Take care that debris is not thrown onto unprotected surfaces. Use a HEPA vacuum to collect paint chips and debris from the work. After disconnecting the power tools, mist and wet wipe the work surface.

Finishing:

Follow *Level 2* procedures.

Clean up

Follow the *General Procedures* corresponding to the level of work.

WP6 ■ Removing Components from Lead-Painted Surfaces

Description

Lead dust and debris can be generated when "painted-over" items are removed from building surfaces. The essence of this work practice is care and caution to avoid any unnecessary contamination.

Examples



Level 1

- Removing hardware or accessories from lead painted windows or doors.
- Removing nails or screws from lead painted walls or door frames.
- Removing cabinet hardware from lead painted cabinets.



Level 2

- Removing painted-over hardware or accessories from doors or windows.
- Removing painted-over electrical, mechanical, or plumbing fixtures, fittings, or covers.
- Removing wood or metal trim from painted surfaces in good condition.
- Removing painted wood or metal trim that will be broken or damaged by removal process.
- Removing wall coverings adjacent to LBP.
- Removing carpet or resilient flooring adjacent to LBP.



Level 3

- Removing vinyl or paper wall covering from lead painted walls.
- Removing carpet or resilient flooring from lead painted floors.
- Removing lead painted acoustic ceiling tile.
- Removing drywall or wood paneling from lead painted walls.
- Removing painted plaster, drywall or wood paneling.
- Removing suspended ceilings that were installed below lead painted surfaces in poor condition.
- Removing glued acoustical tile from lead painted ceilings.

Work Practice

Preparation

Use the *General Procedures* level appropriate for the actual level of work.

Performance ■ Level 1



Surface preparation:

Mist the painted surfaces. Carefully remove any loose paint from the work area using a utility knife or scraper.

Removal:

Use the proper tool for the task. Avoid using hammers to remove screws from a surface, because they may create unnecessary lead dust. Using the proper tool will minimize disturbance of the painted surface. After the components have been removed, collect any chips or debris with a wet cloth.

Performance ■ Level 2

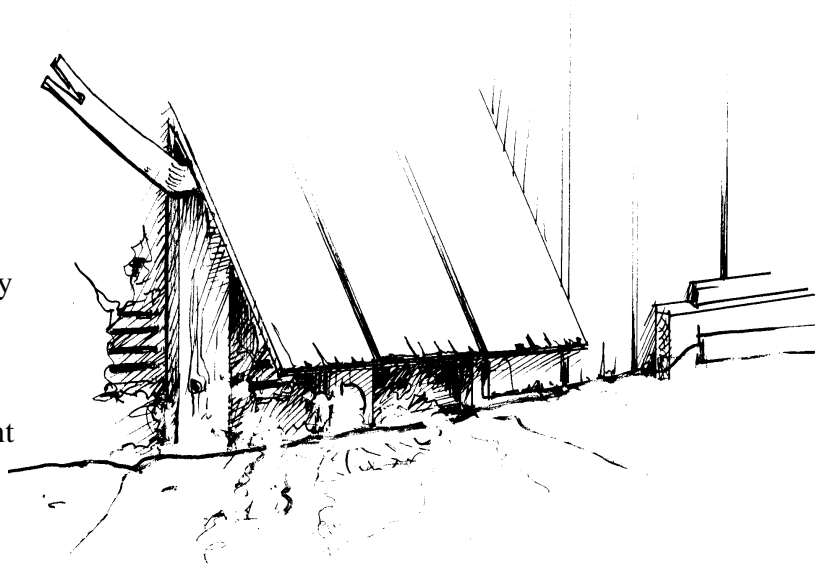


Surface preparation:

Follow the *Level 1* surface preparation procedures.

Removal:

Cut around the painted edges to be separated using a utility knife. Use tools that are appropriate for the task to minimize the disturbance of the painted surface. Carefully remove all nails and screws from the component. You may need to pry the component away from the painted surface. Place wet cloths between the prying tool and the painted surface to minimize disturbance of the painted surface. Chip or wet sand (*see WP4 - Wet*



Sanding) remaining paint edges until no loose paint remains on the surface. Collect chips and debris with a wet cloth and place in a disposal bag.

Note: Many different attachments are available for HEPA vacuums that will allow cleaning most surfaces.

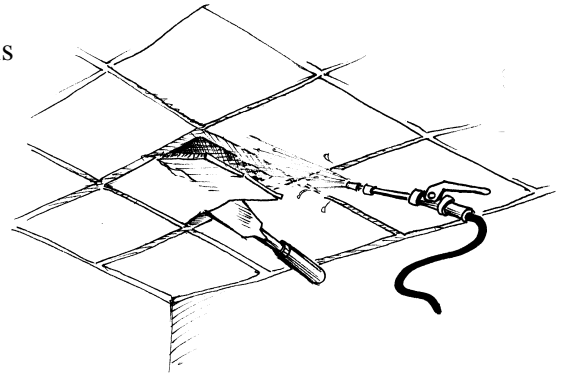
Performance ■ Level 3



Surface preparation:

Use *Level 1* procedures. If the work surface is a floor, surround the work area with drop cloths, taping the edges to minimize the spread of lead dust. It is important to use appropriate tools to minimize the amount of lead-based paint disturbance.

* *The illustration to the right shows removal of glued-on ceiling tile.*



Loosen and pull apart the two surfaces while misting the newly created surface between the two components. Components like carpet and wallpaper should be rolled up with the side that was attached to the lead paint inward, and placed in a disposal bag or wrap in plastic. Wet scrape or wet sand (*See WP4 - Wet Sanding*) remaining painted surfaces until only well-adhered paint remains.

Collect large chips and debris with a wet cloth. Follow the HEPA cleaning procedures found in the *General Procedures - Level 3*.

Clean Up

Perform clean-up according to the *General Procedures* level corresponding to the level of work.

WP7 ■ Attaching to a Lead-Painted Surface

Description

This work practice describes the procedures for attaching items to lead-painted surfaces. If the work is done cautiously, large quantities of lead dust and debris are unlikely to be generated. *Level 2* and *Level 3* activities involve deteriorated surfaces and require some surface preparation before attachment.

Examples



Level 1

- Nailing or installing screws to surfaces with paint in good condition.
- Installing hardware or accessories on painted surfaces in good condition.
- Using adhesives to attach items to painted surfaces in good condition.



Level 2

- Nailing or installing screws to surfaces with chipped or cracked paint.
- Installing hardware or accessories on surfaces with chipped or cracked paint.
- Using adhesives to attach items to surfaces with chipped or cracked paint.
- Attaching items to painted surfaces using power-actuated tools where paint and substrate are in good condition.



Level 3

- Nailing or installing screws to surfaces with significant amounts of lead dust or debris or with substrate in poor condition.
- Attaching items to painted surfaces with chipped or cracked paint and deteriorated substrate using power-actuated tools.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1



Surface preparation:

No surface preparation is required for direct application of adhesives, nails, or screws if paint is in good condition. Mist the work area if a "starter" hole is to be drilled into the surface.

Drilling "starter" hole:

Use Work Practice *WP5 - Penetrating Lead-Based Paint*, procedures to drill hole.

Attachment:

The attachment can be made to the surface. Do not disturb the painted surface any more than is necessary.

Performance ■ Level 2 _____



Surface preparation:

Mist the work surface. Use a putty knife or scraper to remove all loose paint from the work surface.

Collect debris with wet cloths and place in a disposal bag.

Attachment: Attach items to surface with nails, screws or adhesives. Mist the surface when using nails or screws to keep lead dust to a minimum.



Performance ■ Level 3 _____



Surface preparation:

Mist the work surface. Use a putty knife or scraper to remove all loose paint from the work surface. Use a HEPA vacuum to collect any visible dust and debris. Use **Work Practice WP11 - Patching a Lead-Painted Surface**, to repair surfaces before attaching an item.

Attachment:

Follow the *Level 2* attachment procedures for nails, screws, and adhesives. To attach an item using power-actuated tools, ensure that all loose paint has been removed and the substrate is solid. Place a piece of duct tape over the attachment spot. Make the attachment through the tape to reduce lead dust.

Clean-Up

Perform clean-up according to the *General Procedures* corresponding to the actual level of work being performed.

WP8 ■ Applying Coatings to Lead-Painted Surfaces

Description

Surface preparation is an important element of this work practice. It is essential the surfaces be clean and stable prior to application of coating materials. Manufacturers' instructions must be followed precisely.

Where paint is in good condition and coating will not cause visible flaking or chipping, coatings can be applied with normal preparation. Where paint is flaking or surface is unsound, preparing and applying a coating will require additional precautions.

Examples



Level 1

- Applying paint or sealer over surfaces in good condition.
- Preparing for and applying liquid encapsulants over surfaces in good condition.



Level 2

- Applying paint or sealer over painted surfaces that are cracked or chipped.
- Applying liquid encapsulants over painted surfaces that are cracked or chipped.
- Applying paint over glossy surfaces after abrasive preparation of the surface.



Level 3

- Applying paint or sealer to deteriorated painted surfaces.
- Applying liquid encapsulants over surfaces with deteriorated substrates.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1



Paint and sealer application:

Coatings may be applied directly over lead-painted surfaces. Take precautions to minimize disturbance of surfaces below the newly-applied coating.

Liquid enclosure material (encapsulants):

All liquid encapsulants should be applied following the manufacturers' instructions. The material should first be applied to a small area to determine if it is compatible with the lead-painted surface. The material should adhere to the surface, form a continuous hard finish and provide a permanent barrier.

Note: HUD defines permanent as 20 year service life.

Apply the encapsulant so that it forms a continuous, permanent seal around the lead-painted surface. Do not disturb the surface until the encapsulant completely hardens.

Note: Encapsulants should not be used on friction surfaces such as floors. Friction can cause the encapsulant to deteriorate and expose the lead-painted surfaces again.

Performance ■ Level 2



Surface Preparation:

Use *WP3 - Removing Small Areas of Paint* to remove any chipped or cracked paint from the work surface. *WP4 - Wet Sanding* may be used to remove additional paint or to prepare a glossy surface to receive a new coating. All remaining paint must be well adhered to the underlying layers and to the substrate. Collect any dust and debris created by this process with wet cloths and place in a disposal bag.

Paint or sealer application:

Paint or sealer can be applied directly over the surface. Take precautions to minimize disturbance of the surface below the newly applied coating.

Liquid Encapsulants:

All liquid encapsulants should be applied following the manufacturer's instructions. The surface should be cleaned using the manufacturer's instructions to eliminate dirt, oil and grease, chalking, and other conditions that would inhibit good adhesion of the coating to the existing surface. Under certain conditions, the surface must be primed prior to applying a liquid encapsulant. See the manufacturer's directions.

Performance ■ Level 3



Surface preparation:

Follow the *Level 2* surface preparation procedures. If the substrate needs repair, use *WP11 - Patching a Lead-Painted Surface* prior to applying a coating. Use a HEPA vacuum to collect paint chips and debris.

Paint or sealer application:

Paint or sealer can be applied directly over the surface. Take precautions to minimize disturbance of the surface below the newly applied coating.

Liquid Encapsulants:

Most liquid encapsulants can be applied using the *Level 2* application procedures.

Some liquid encapsulant coating systems are suitable for use where the existing substrate is deteriorated for some reason. The selection of the encapsulant system should be made based on the anticipated level of mechanical stress and abuse. Consult the manufacturer for help in selecting the proper encapsulant system.

Some encapsulant coating systems have the ability to fill cracked and/or damaged substrates due to the allowable thickness of the coating. If these coatings are reinforced, the strength of the system is greatly increased. If the encapsulant is also mechanically attached to the substrate (*See WP7 - Attaching to a Lead-Painted Surface*) the result is a relatively rigid, seamless barrier suitable for use on deteriorated substrates.

Clean-Up

Perform clean-up according to the *General Procedures* corresponding to the actual level of work being performed.

WP9 ■ Installing Materials Over Lead-Painted Surfaces

Description

Most materials can be installed over lead-painted surfaces. Surface preparation is an important element of this work practice. In some situations it may be desirable to first perform *WP1 - Removing Paint Chips and Debris* and/or *WP11 - Patching a Lead-Painted Surface at Level 3*. *WP9* can then be executed at a lower level. These materials are not effective in creating "enclosure" to prevent migration of lead paint dust.

Examples



Level 1

- Installing carpet or resilient flooring over floors with paint intact and substrate in good condition.
- Installing acoustic, or decorative tile, over walls or ceilings with paint intact and substrate in good condition.
- Installing paper, vinyl, or fabric wall or ceiling coverings over surfaces in good condition.



Level 2

- Installing carpet or resilient flooring over floors with chipped or cracked paint.
- Installing acoustic, or decorative tile, over walls or ceilings with chipped or cracked paint.
- Installing paper, vinyl, or fabric wall or ceiling coverings over painted surfaces that are chipped or cracked.

Caution: In some cases these activities could generate more than a moderate amount of dust and debris, requiring Level 3 work practices.



Level 3

- Installing resilient flooring over floors with chipped, cracked, or flaking paint and a deteriorated substrate.
- Installing acoustic, or decorative tile, over walls or ceilings with chipped, cracked, or flaking paint and a deteriorated substrate.
- Installing paper, vinyl, or fabric wall, or ceiling coverings over painted surfaces that are chipped or cracked with deteriorated substrate (not a recommended practice.)

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1



Installation:

Carefully cut, fit, and install materials without disturbing the surface. If paint chips or debris are created, wet wipe the surfaces and plastic drop cloth and place in a disposal bag.

Performance ■ Level 2



Surface preparation:

For work on floors, surround the work surface with drop cloths, taping down the edges. Mist the surface. Use a putty knife or scraper to remove all loose paint from the work surface (*WP1 - Removing Paint Chips and Debris*). Damp mop or wet wipe the surface before installation.

Installation:

Follow the *Level 1* installation instructions.

Performance ■ Level 3



Surface preparation:

Use the *Level 2* surface preparation procedures. Use a HEPA vacuum to collect excess dust and debris (*WP1 - Removing Paint Chips and Debris*) before wet mopping or wet wiping (*WP2 - Cleaning Damaged or Deteriorated Surfaces*). Use Work Practice *WP5 - Penetrating Lead-Based Paint* to remove substrate material before installation. Use Work Practice *WP11 - Patching a Lead-Painted Surface* to patch the surface before installation.

Installation:

Follow the *Level 1* installation instructions.

Clean-Up

Perform clean-up according to the *General Procedures* corresponding to the actual level of work being performed.

WP10 ■ Enclosing a Lead-Painted Surface

Description

The risk of exposure to lead dust from badly deteriorated surfaces can be minimized by enclosing the surfaces with permanent, rigid barriers. Barriers may be drywall, tongue and groove wood, concrete, masonry, metal, surface applied materials, such as stucco, or other permanent enclosure systems. Enclosures should not be used if future access to the enclosed area may be needed or if the enclosure is likely to be damaged.

For surfaces where paint or substrate is deteriorated, Work Practices *WP3 - Removing Small Areas of Paint*; *WP5 - Penetrating Lead-Based Paint*; or *WP11 - Patching a Lead-Painted Surface* should be used prior to enclosing the surface.

Examples



Level 1

- Installing enclosures over surfaces, including walls, ceiling, and floors with paint intact and substrate in good condition.
- Installing drywall or paneling over walls or ceilings with paint intact and substrate in good condition.



Level 2

- Installing enclosures over surfaces having chipped or cracked paint.
- Installing drywall or paneling over walls or ceilings with chipped or cracked paint.

Caution: In some cases these activities could generate more than a moderate amount of dust and debris, requiring Level 3 work practices.



Level 3

- Installing enclosures over surfaces having chipped, cracked, or flaking paint and a deteriorated substrate.
- Installing drywall or paneling over walls or ceilings with chipped, cracked, or flaking paint and a deteriorated substrate.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1

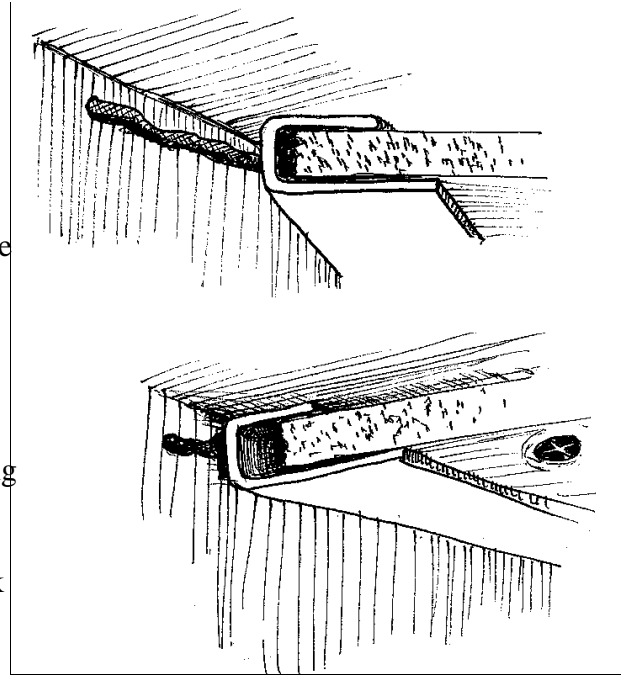


Rigid Enclosure:

Cut, fit, and install enclosure materials without disturbing the prepared painted surface.

Apply a continuous bead of sealant at all perimeters, joints, openings, or penetrations to provide a permanent barrier to prevent the migration or release of lead contaminated dust.

Dry wall may be sealed at the edges using tape and spackle; or use "J" channels around cut edges of drywall. Place sealant bead continuously along the back side of rigid enclosure materials, before installation, for a dust-tight seal.





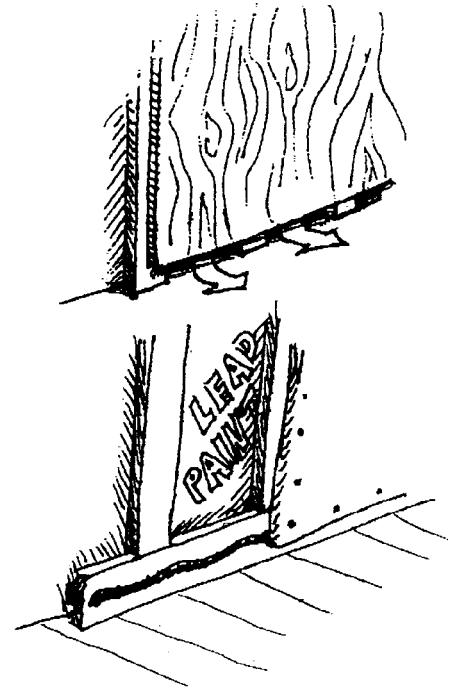
Surface preparation:

Mist the work surface. Use Work Practice *WP1 - Removing Paint Chips and Debris* to remove any chipped or flaking paint. Use *WP4 - Wet Sanding* to finish the painted edges. Remaining paint must be well-adhered to the underlying layers and to the substrate.

Enclosure:

Follow the *Level 1* installation procedures for rigid enclosures.

Write "lead-paint" on the wall. Run a bead of caulk on the perimeter edges, particularly the bottom edge. Fasten board to wall or furring strips. Set baseboard into bead of caulk. Set shoe molding into bead of caulk.

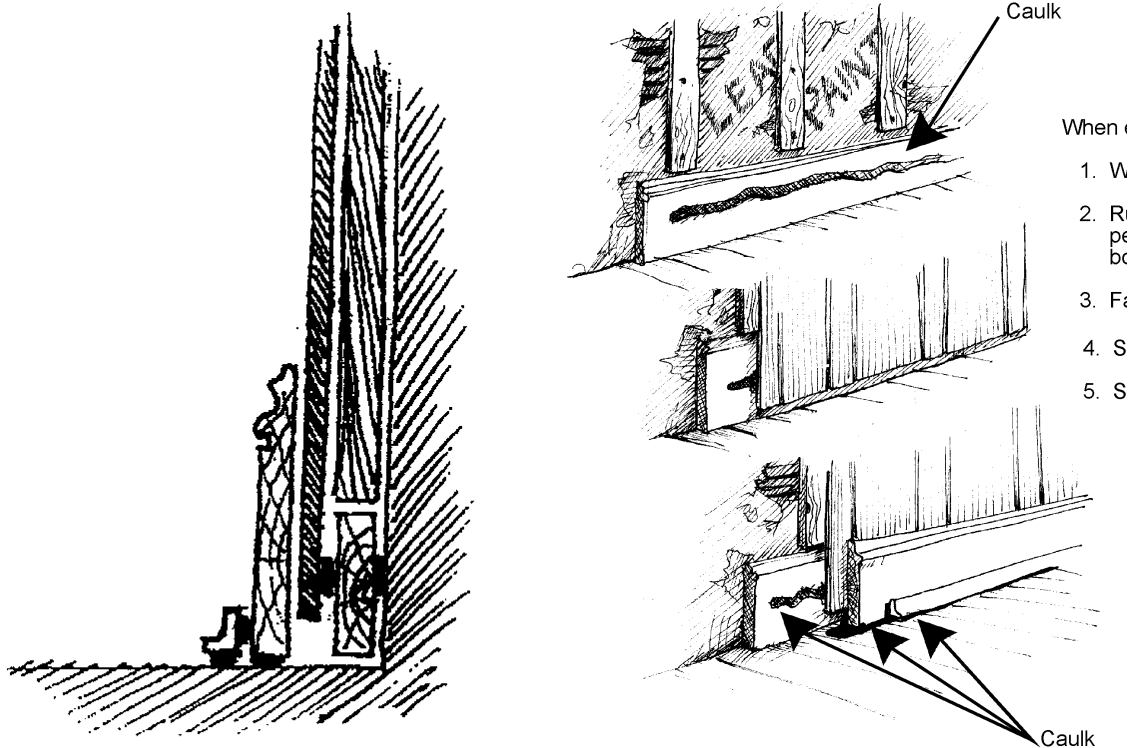


Performance ■ Level 3



Surface preparation:

Mist the work surface. Use Work Practice *WP1 - Removing Paint Chips and Debris* to remove any chipped or flaking paint. Use *WP5 - Penetrating Lead-Based Paint* and *WP11 - Patching a Lead-Painted Surface* to repair deteriorated substrate. Use *WP4 - Wet Sanding* to finish the painted edges.



Enclosure:

Follow the *Level I* installation procedures for rigid enclosures.

Clean-Up

Perform clean-up according to the *General Procedures* corresponding to the actual level of work being performed.

WP11 ■ Patching a Lead-Painted Surface

Description

It may be necessary to patch building surfaces prior to executing other lead O&M work practices or to restore a surface. The levels of expected dust generation will depend on the type of material (wood versus plaster, for example) and on the condition of both paint, surface material, and substrate. Where paint and surface to be patched are in good condition and patching will not cause visible flaking or chipping of paint, patching can take place with normal preparation. Where existing paint or surfaces are unsound or patching will cause extensive paint disruption, additional precautions will be required.

Examples

All *Level 1* examples are for surfaces where the paint and substrate are intact and in good condition.



Level 1

- Patching small holes after removing hardware or accessories.
- Patching small holes or cracks prior to applying coatings to the surface.
- Patching small holes or cracks prior to installing materials over the surface, or enclosing the surface.

All *Level 2* examples are for surfaces where the paint is deteriorated but the substrate is in good condition.



Level 2

- Patching holes or cracks after removing hardware or accessories.
- Patching holes created by using Work Practice *WP5 - Penetrating Lead-Based Paint*, prior to applying coatings, installing materials, or enclosing.
- Patching holes or cracks discovered after removing components from a surface using Work Practice *WP6 - Removing Components from Lead-Painted Surfaces*.

All *Level 3* examples are for surfaces where the paint and substrate are deteriorated.



Level 3

- Patching holes after removing hardware or accessories.
- Patching large holes created by using Work Practice *WP5 - Penetrating Lead-Based Paint*, prior to applying coatings, installing materials, or enclosing.
- Patching large holes discovered after removing components from a surface using Work Practice *WP6 - Removing Components from Lead-Painted Surfaces*.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1



Patching:

Install patch as smoothly as possible over the surface. Use a putty knife or similar tool to further smooth surface. Wet Sanding (*see WP4 - Wet Sanding*) may be used to finish, if desired. Use Work Practice *WP8 - Applying Coatings to Lead-Painted Surfaces* to apply paint or sealer over the surface after Patching.

Performance ■ Level 2



Surface preparation:

Mist the work surface. Use a putty knife or scraper to remove all loose paint from the work surface. Use Work Practice *WP5 - Penetrating Lead-Based Paint* to remove a damaged section before applying a patch.

Patch Installation:

Drywall patches should fit the damaged area loosely so that the surrounding painted drywall is not disturbed by prying or hammering the patch in place.

Remove loose paint around the edges of patches on walls and ceilings to be textured. This will allow texturing without disturbing existing paint.

Make a clean cut on wood surfaces to be patched using wet methods (*see WP5 - Penetrating Lead-Based Paint*). Use Work Practice *WP7 - Attaching to a Lead-Painted Surface*, if the patch is nailed on to a lead-painted surface. Use Work Practice *WP8 - Applying Coatings to Lead-Painted Surfaces* to apply paint or sealer over the surface after patching.

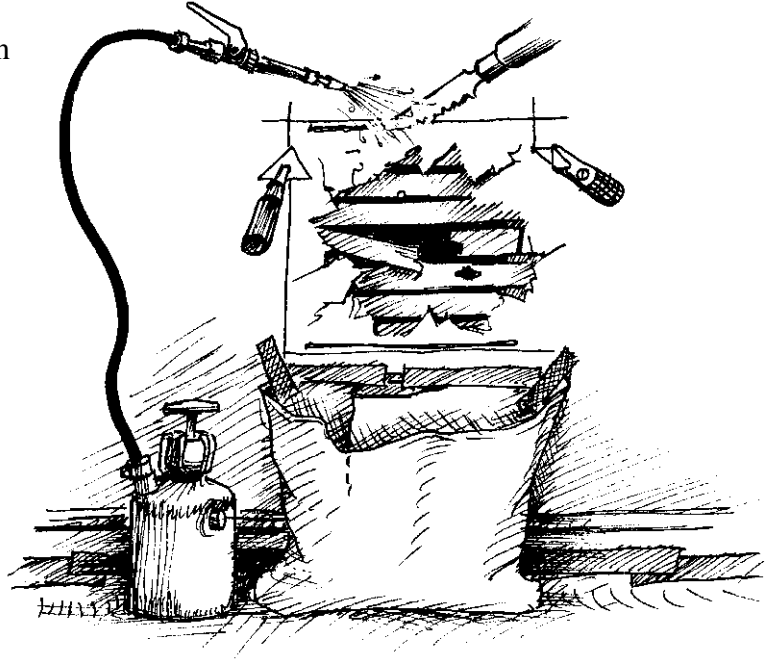
Performance ■ Level 3



Surface preparation:

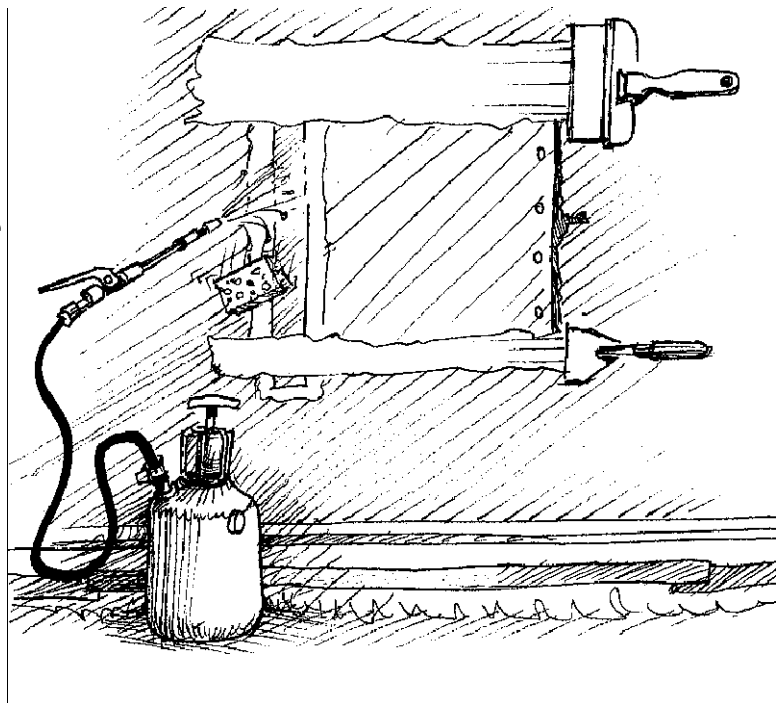
Follow the *Level 2* preparation procedures. Use a HEPA vacuum to remove excess paint chips and debris.

1. Tape plastic bag below area to be repaired.
2. Cut perimeter.
3. Wet scrape the cut line.
4. Saw inside the cut line, while misting. Remove damaged plaster within cut line.



Patch installation:

5. Install the patch following procedures in *Level 2* above.
6. Tape, block, and skim the perimeter of the patch.
7. Wet sand or sponge tape joint to make smooth.



Use a putty knife for a smooth finish between the patch and the existing lead-painted surface. Use **WP4 - Wet Sanding** to smooth patch before applying coating. Use Work Practice **WP8 - Applying Coatings to Lead-Painted Surfaces** to apply paint or sealer over the surface after patching.

Clean-Up

Perform clean-up according to the **General Procedures** corresponding to the actual level of work being performed.

WP12 ■ Exposing Lead Paint Contaminated Cavities

Description

Removal of building components such as window casings and door jambs may release large accumulations of lead dust and debris. The size of opening and the height that debris may fall should be considered in establishing the work level. Lead dust falling 9 feet from crown molding creates a much greater risk of exposure than does the same quantity of lead dust exposed behind baseboard molding at floor level. This work practice minimizes the exposure to lead contaminated dust when cleaning dust and debris from cavities exposed by removing building components.

Examples



Level 1

- Removing a plumbing access cover.
- Removing an electrical switch plate.
- Removing trim such as cap/shoe molding on baseboards, base trim, or window trim where paint and substrate are in good condition and negligible amounts of dust or debris are expected to be released.



Level 2

- Removing trim such as baseboards, base trim, or window trim where the paint is deteriorated or moderate amounts of dust or debris are expected to be released.
- Removing door jambs or window casing where the paint is deteriorated or moderate amounts of dust or debris are expected to be released.
- Cutting or drilling holes through a surface exposing a cavity where moderate amounts of dust or debris are expected.



Level 3

- Removing trim such as baseboards, base trim, or window trim where the paint and substrate are deteriorated or significant amounts of dust or debris are expected to be released.
- Removing door jambs or window casing where the paint and substrate are deteriorated or significant amounts of dust or debris are expected to be released.
- Cutting or drilling holes through a surface exposing a cavity where significant amounts of dust or debris are expected.
- Accessing the area above a suspended ceiling.

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Note: If after exposing a cavity, more dust or debris is present than anticipated, perform the *General Procedures* corresponding to the higher level of dust or debris.

Warning: Before removing components that expose electrical connections, disconnect all power and lock out the circuit!

Performance ■ Level 1



Component removal:

Remove the cavity cover using an appropriate tool. If the component is covered with lead-based paint, use Work Practice *WP5 - Penetrating Lead-Based Paint*.

Cleaning:

Use wet cloths to wet wipe the interior surfaces and place in a disposal bag. Allow surfaces to dry before using electrical tools on them or restoring electricity to circuits that have been de-energized.

Replace the building components to seal the cavity. Use Work Practice *WP7 - Attaching to a Lead Painted Surface*, if the components are attached to a surface covered by lead-based paint.

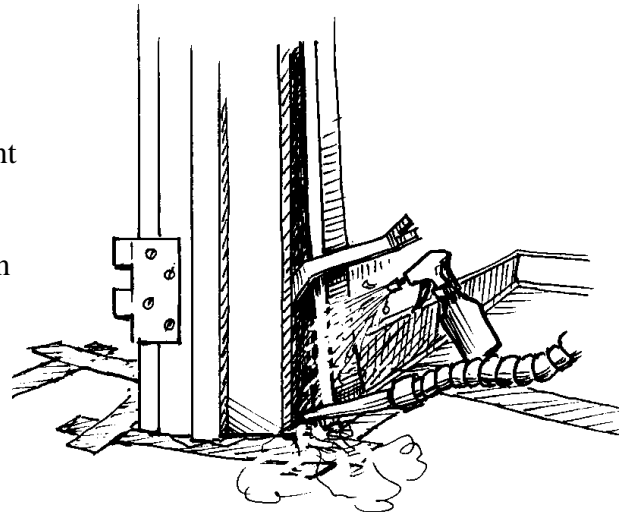
Performance ■ Level 2



Surface preparation:

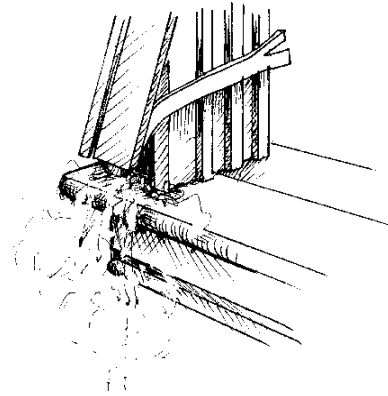
Mist any surface to be removed that has flaking or chipping paint. Use a putty knife or scraper to remove any loose paint from the surface.

Remove the building component using an appropriate tool. If the component contains lead-based paint, use Work Practice *WP5 - Penetrating Lead Paint*, or *WP3 - Removing Small Areas of Paint*.



Cleaning:

Use Work Practice *WP2 - Cleaning Damaged or Deteriorated Surfaces* to clean the interior surface. Replace the building components to seal the cavity. Use Work Practice *WP7 - Attaching to a Lead-Painted Surface* if the components are attached to a surface covered by lead-based paint. Allow surfaces to dry before using electrical tools on them or restoring electricity to circuits that have been de-energized.



If cover plate or trim is to be reused, wet wipe or scrape the back to remove any loose paint and dust. Allow surfaces to dry before using electrical tools on them or restoring electricity to circuits which have been de-energized.



Performance ■ Level 3

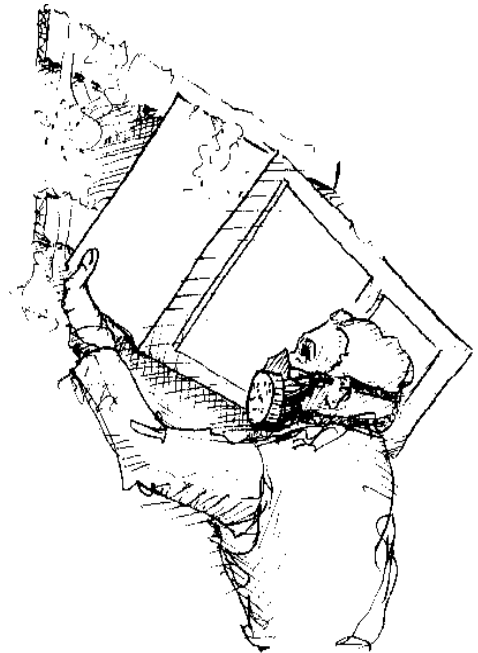


Surface preparation:

Mist any exterior surfaces to be removed that have flaking or chipped paint. Use a putty knife or scraper to remove any loose paint. Collect visible debris with wet cloths and place in a disposal bag.

Use a utility knife to score any edges around cover plates or trim that are sealed by paint.

Carefully remove any screws or nails holding the component in place. Remove the component to expose the cavity.





Removing a drop ceiling below a deteriorated lead-painted ceiling can expose large quantities of accumulated dust and debris and be very hazardous.

Cleaning:

Use a HEPA vacuum to clean dust and debris from the cavity. Use an appropriate attachment to reach concealed surfaces. Wet wipe the interior of cavity using Work Practice ***WP2 - Cleaning Damaged or Deteriorated Surfaces*** procedures.

If cover plate or trim is to be reused, wet wipe or scrape the back to remove any loose paint and dust. Allow surfaces to dry before using electrical tools on them or restoring electricity to circuits that have been de-energized.

Clean-Up

Perform clean-up according to the ***General Procedures*** corresponding to the actual level of work being performed.

WP13 ■ Door and Window Maintenance

Description

Friction between lead-painted doors and windows and jambs may produce lead dust. Lead dust may also be formed by sticking doors that crush lead-based paint on the hinge side of the door. Door and window maintenance will frequently involve using work practices *WP3 - Removing Small Areas of Paint*, *WP5 - Penetrating Lead-Painted Surfaces*, *WP7 - Attaching to a Lead-Painted Surface*, and *WP12 - Exposing Lead-Paint Contaminated Cavities*. This work practice includes additional precautions for certain door and window maintenance, such as rebuilding, removing, and replacing doors and windows.

Examples



Level 1

- Repairing loose door hinges.
- Removing door or hinge when door is painted with lead-based paint.



Level 2

- Repairing sticking doors painted with lead-based paint.
- Unsticking painted-shut windows.
- Removing window units for replacement.
- Reglazing doors or windows after removal.



Level 3

- Repairing, cutting, or rebuilding damaged doors or windows.
- Reglazing doors or windows in-place.
- Replacing badly deteriorated window units.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work.

Performance ■ Level 1

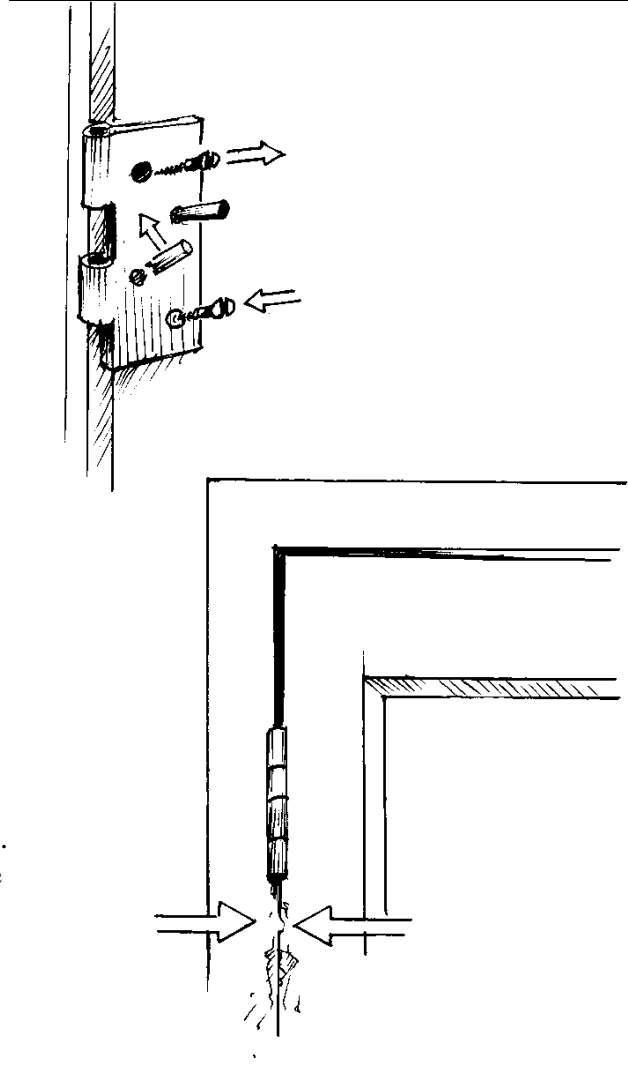


Door Maintenance:

If the hinges are loose and the door jamb is sound, remove the hinge screws one at a time. Place a dowel in the screw hole. Break off or cut the dowel flush to the surface, and install new screws.

If dowels are not large enough to tightly fill screw holes, use a utility knife to cut around the edges of the hinge if it has been painted over. Move the hinge away from the jamb and place dowels in the screw holes. Break or cut the dowels off flush to the surface, and reattach the hinge to the jamb.

If the door is crushing against the jamb on the hinge side, unscrew the hinge screws and add a shim behind the hinge leaf to create a 1/8" space between the door and the hinge jamb. If the shim causes the door to rub the door frame on the latch side, plane the hinge side of the door. Replace the hinge screws.



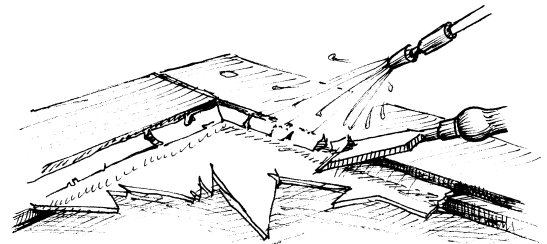
Performance ■ Level 2

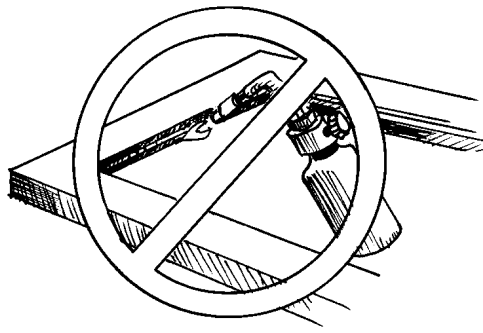


Surface preparation:

Mist the work surface. Use a utility knife to cut around the edges of the surfaces to be separated. Use a utility knife or scraper to scrape loose the putty and glazing stops on the window.

Collect any debris with a wet cloth and place in a disposal bag.

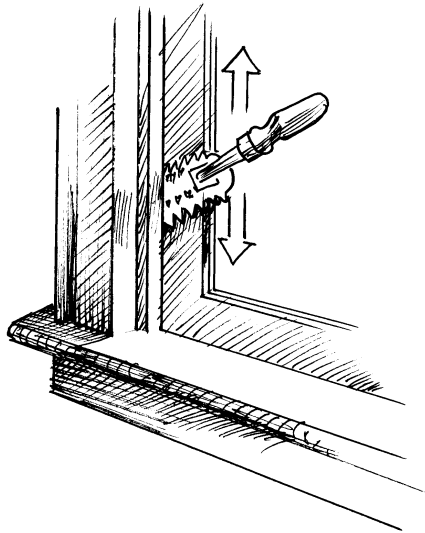




Caution: Open flame torches should never be used to soften painted glazing putty because the heat may create lead fumes.

Replacing or repairing window or door:

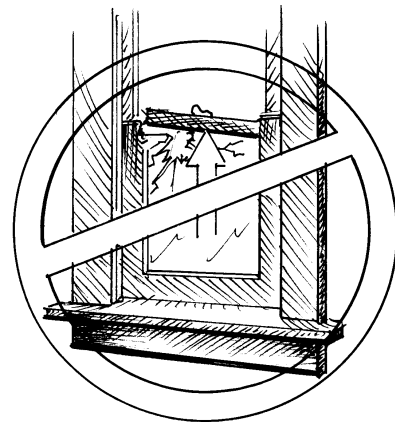
Carefully pry or cut apart painted door and window parts. After repairs are complete, or after new component is obtained, reinstall door or window carefully so that the lead paint is not disturbed.

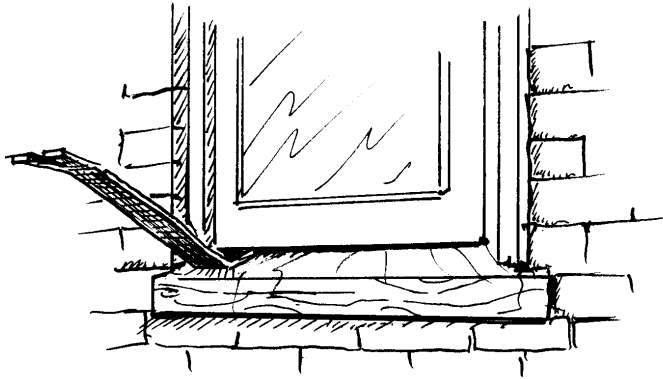


Unsticking painted-shut windows:

Run window zipper, or similar cutting tool, between sash and inside stop, between sash and parting bead, and between sash and outside stop.

Caution: Do not bang against the top rail of the bottom window sash. This may break both the sash and the glass and may creating lead dust and debris.





Go outside and pry upward on the window from the bottom, first one side and then the other. Place a wet cloth between the pry bar and outside window sill to reduce damage to the painted surface. Pry under the window style, not under the glazing.

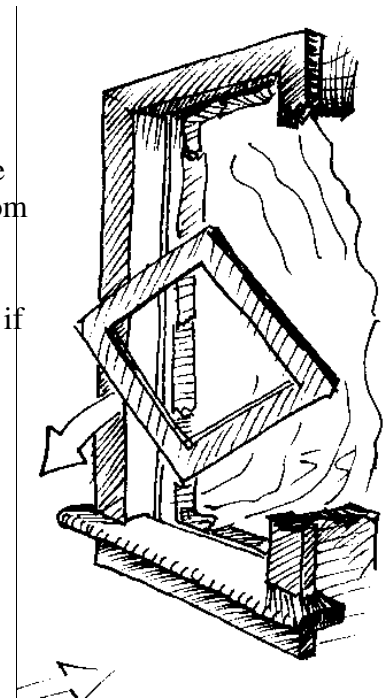
Wet sand or wet scrape (*see WP4 - Wet Sanding*) the painted edges to remove any loose paint. Clean the window trough, stool, and sill using Work Practice **WP2 - Cleaning Damaged or Deteriorated Surfaces**. Use a HEPA vacuum if available.

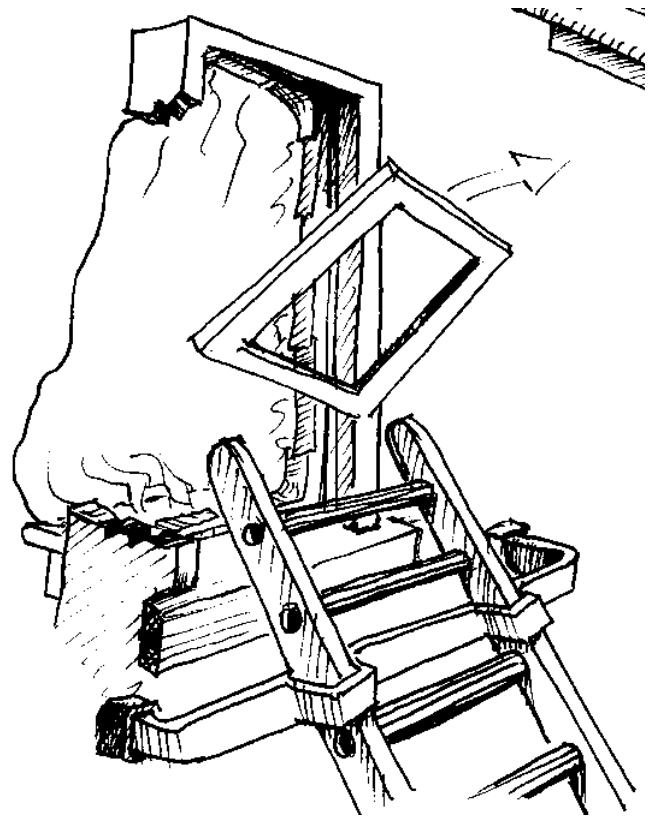
Planing Doors:

If the door rubs against the latch side jamb because of the shim or because of settling, swelling, or paint build-up, remove the door from the hinges. Use Work Practice **WP5 - Penetrating Lead-Based Paint** to plane the edge of the door. Re-hang the door.

Window replacement units:

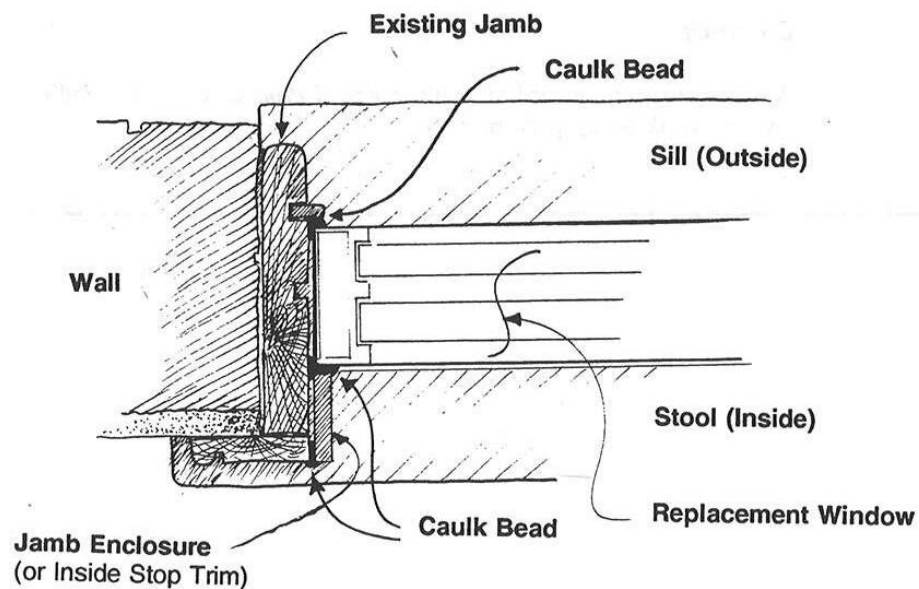
Installing a new window into an old jamb does not require removing the jamb or casing. If you perform the work from inside, staple plastic over all openings to prevent outside contamination. Mist the area and clean up debris as the window is disassembled. Clean up with a HEPA vacuum if available.





If you perform the work from outside the building, completely seal the opening to the inside with plastic. Remove window sash, stop, and parting bead. Completely wet-scrape, HEPA vacuum, and wash the window opening before removing the plastic seal.

The jamb on the replacement window unit should be caulked inside and out. Install the new window against a bead of caulk which runs down the inside of the outside stop. Place the inside stop into a bead of caulk on the inside of the new window unit.



Performance ■ Level 3



Surface preparation:

Mist the work surface of the door or window. Use a utility knife to cut around the edges of the surfaces to be separated. Scrape away loose paint, caulk, and glazing steps (*WP3 - Removing Small Areas of Paint*). Collect large pieces of debris with a wet cloth and place in a disposal bag. HEPA vacuum remaining dust and debris from surface.

Repairing, cutting or rebuilding damaged doors or windows:

Mist the work surface. Remove deteriorated sections of the door using the sawing or prying procedures in Work Practice *WP5 - Penetrating Lead-Based Paint*. Patches may be applied to a door using Work Practice *WP11 - Patching a Lead-Painted Surface*. Coating may be applied to a door using *WP8 - Applying Coatings to Lead-Painted Surfaces*.

Replacing badly deteriorated window units:

Use the *Level 2* procedures to disassemble the window unit, while HEPA vacuuming the dust and debris that is created. Use the *Level 2* window replacement units instructions to install new window units.

Replacing windows in place:

Use the *Level 2* instructions for replacing windows. Use a HEPA vacuum to collect any dust and debris that is created.

Clean-Up

Perform clean-up according to the *General Procedures* corresponding to the actual level of work being performed.

WP14 ■ Changing Filters and Waste Bags in HEPA Vacuums

Description

Filters and waste bags in High Efficiency Particulate Air (HEPA) vacuums must be changed periodically. These materials may contain quite significant quantities of lead dust. If waste bags are torn or break apart when dropped, significant contamination and risk of exposure is possible. HEPA-filtered vacuums used for cleaning lead-based paint dust and debris can be emptied and cleaned by following these procedures. This work practice contains the procedures necessary for this work and does not require the use of a General Work Procedure.

Note: This procedure need not be hazardous if done carefully and with due caution.

Examples



Level 3

- Removing/Replacing waste bag.
- Removing/Replacing HEPA filter.
- Cleaning interior and/or maintaining HEPA vacuum.
- Removing HEPA filter and waste bag from vacuum and wet wiping vacuum.
- Emptying HEPA vacuum.

Work Practice

Preparation

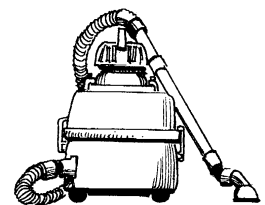
Prepare an area of work that is enclosed, preferably away from occupied living space, and out of traffic paths. Install plastic drop cloths over fixed-in-place equipment or furnishings that will remain in room. Place two plastic drop cloths on top of each other on the floor in the area of work. Tape and seal plastic drop cloths. Extend drop cloths five (5) feet in all direction from the vacuum cleaner, or to a maximum allowable distance.

Performance ■ Level 3



Removing HEPA filter and waste bag:

Some HEPA vacuums require the removal of the HEPA filter and waste bag at the same time. Other vacuums have the HEPA filter removed separately from the waste bag. Check the manufacturer's instructions to determine which case applies.



Follow the manufacturer's instructions to remove the HEPA filter. Place the filter in a

disposal bag. If the waste bag is also removed, gently collapse the bag slightly to remove excess air. Place a piece of tape over the opening to seal it closed and place it in a disposal bag.

Installing HEPA filter/waste bag:

Follow the manufacturer's instructions for installing the HEPA filter and/or waste bag. It is important to ensure the HEPA filter is installed properly and seated well into the unit.

Cleaning the HEPA vacuum:

If a second HEPA vacuum is available, use it to vacuum clean the inside of the first HEPA vacuum. When the HEPA vacuum filter or waste bag change is complete, wet wipe the inside and outside of the vacuum thoroughly.

Clean-Up

Complete clean-up using the *General Procedures for Level 3 Clean-up*.

WP15 ■ Cleaning or Removing Contaminated Carpet

Description

It is extremely difficult, sometimes impossible, to remove lead dust from contaminated carpet. Large quantities of dust can accumulate under carpets. Some studies indicate that dry vacuuming can increase the risk of lead exposure by bringing accumulated lead dust nearer to the surface. This can be especially dangerous for crawling infants.

Cleaning carpets by wet methods, when performed properly, can be useful in removing gross accumulations of lead dust and debris. Methods are also included for removing and disposing of contaminated carpet.

Examples



Level 1

- Cleaning a small section of lead paint contaminated carpet.



Level 2

- Removing a small section of lead paint contaminated carpet.



Level 3

- Removing and disposing of lead paint contaminated carpet.
- HEPA vacuuming or wet cleaning lead paint contaminated carpet.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work. Drop cloths will be omitted.

Performance ■ Level 1



Surface preparation:

Move objects off of the area to be cleaned. Do not use plastic drop cloths. Collect visible lead paint debris with wet cloths and/or HEPA vacuum before starting work.

Note: The carpet should only be cleaned using a HEPA vacuum or wet methods.

HEPA vacuuming:

Vacuum the area thoroughly with at least two passes over each area that are 90° to each other. Use *WP14 - Changing Filters and Waste Bags in HEPA Vacuums* to change the filter or waste bag.

Wet cleaning:

Mist the area of the carpet to be cleaned. Thoroughly clean the carpet using lead-specific cleaning solution and appropriate rags or sponges. Rinse the area thoroughly with clean water and dispose of any waste appropriately.

Performance ■ Level 2 _____



Surface preparation:

Use the *Level 1 - Surface Preparation* procedures.

Removing small section:

Mist the area of the carpet to be removed. Continue to mist the area while cutting the carpet with a carpet knife, or similar tool. Place carpet piece in a disposal bag. Collect any visible debris on the floor under the removed section with wet cloths and place in the disposal bag, or use a HEPA vacuum.

Performance ■ Level 3 _____



Surface preparation:

Use the *Level 1 Surface Preparation* procedures.

Use a HEPA vacuum to collect dust and debris before cleaning or removing carpet.

Note: The carpet should only be cleaned using a HEPA vacuum or wet methods.

HEPA vacuuming:

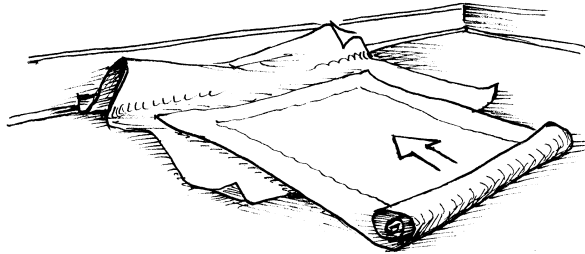
Vacuum the carpet thoroughly making several passes over the carpet in one direction followed by several passes 90° to the first. Use *WP4 - Changing Filters and Waste Bags in HEPA Vacuums* to change the filter or waste bag.

Wet cleaning:

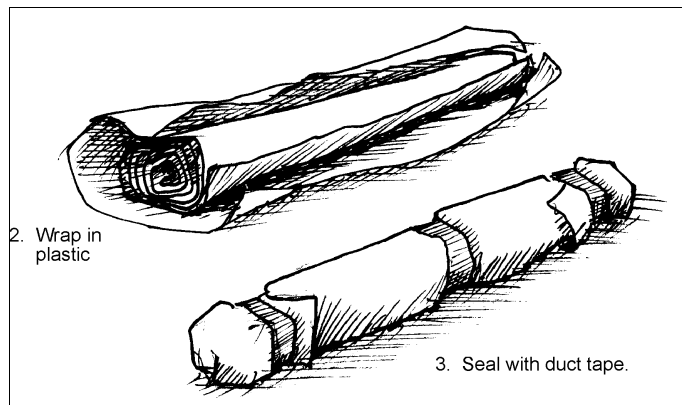
Clean the carpet in sections. Mist the section to be cleaned. Thoroughly clean the section using lead-specific cleaning solution and appropriate rags or sponges. Rinse each section with clean water and change water before moving to the next section. Dispose of waste appropriately.

Removing carpet:

Carpet can be cut into sections or removed whole. Before cutting the carpet into sections, mist the entire carpet. Use a carpet knife or similar tool to cut the carpet into smaller sections which can be handled easily. Place the sections in a disposal bag.



If the carpet is removed whole, continuously mist the carpet as it is rolled inward on itself. HEPA vacuum any debris accumulated under the carpet, avoid getting water into the HEPA vacuum. Wrap the carpet in 6 mil plastic and seal for disposal.



Clean-Up

Follow the *General Procedures* corresponding to the actual level of work.

WP16 ■ Landscaping in Soil Containing Elevated Levels of Lead

Description

Soil known to be contaminated with lead should be wetted whenever landscaping or other disturbance is necessary. Wetted soil can be carefully raked to remove paint chips and debris. Planting grass or ground cover on bare soil can help reduce the transfer of lead-based paint dust to the interior of buildings by foot traffic.

Examples



Level 2

- Raking, digging or tilling soils with known lead paint dust.
- Removing soil with known lead paint dust for purposes of reducing the hazard.
- Raking loose paint chips off the soil surface.

Work Practice

Preparation

Use the *General Procedures* level corresponding to the actual level of work. For work on the ground, do not use plastic drop cloths on work area. Drop cloths should be used to surround the work area where soil will be disturbed.

Caution: Use only hand tools for raking, digging or tilling soil.

Performance ■ Level 2



Raking, digging or tilling soil:

Work in soil when soil is damp or wet to reduce exposure to lead paint dust. Take care to keep soil wet and move it as little as possible. Clean dirt off clothing and tools before leaving work area.

Soil removal:

Move soil while thoroughly wet to reduce exposure to lead paint dust. Do not lift or drop soil in such a way that soil or dust can scatter outside of prepared area. Dispose of contaminated soil in bag of 6 mil thickness or greater.

Caution: Do not overload bag.

Raking, loose paint chips:

Work on small sections of soil to prevent a large build-up of lead chips. Rake chips into a small pile and place into a disposal bag. Take care not to disturb the soil under the paint chips.

Clean-Up

Drop cloths, if used, should be rolled inward and placed in disposal bags with other waste.

Waste generated during O&M work may be regulated as a hazardous waste as described under the Resource Conservation and Recovery Act (RCRA). In addition, individual state and/or local regulations must be complied with. Hazardous waste requirements under RCRA and other state/local regulations describe the necessary treatment of waste to ensure that its handling and disposal will not adversely impact the environment.

After all work has been completed, thoroughly wash face and hands. Do not eat, drink, or smoke during O&M activities or before washing.

Appendix A - Glossary

AAAL: American Association for Laboratory Accreditation. Also known as A2LA.

Abatement: A measure designed to permanently eliminate lead-based paint hazards according to standards established by the Environmental Protection Agency (EPA) Administrator, pursuant to Title IV of the Toxic Substances Control Act (TSCA). Abatement strategies include the removal of lead-based paint, its enclosure, its encapsulation with a product shown to meet established or recognized standards pursuant to Title IV of TSCA, replacement of building components coated by lead-based paint, removal of lead-contaminated dust, and removal of lead-contaminated soil or overlaying of a durable covering—not grass or sod, which are considered interim control measures—on top of the soil, as well as preparation, cleanup, disposal, post-abatement clearance testing, recordkeeping, and, if applicable, monitoring.

Abrasion resistance: Resistance of the paint to being worn away by rubbing or being exposed to friction; related to both toughness and gloss.

Accessible surface: Any interior or exterior surface such as sills and protruding surfaces that a young child can mouth or chew.

Accreditation: A formal recognition that an organization, such as a laboratory, is competent to carry out specific tasks or types of tests.

Accredited laboratory: A laboratory that has been evaluated and approved by an accrediting body, such as the National Lead Laboratory Accreditation Program, to perform a specified measurement or task, usually for a specific property or material to be analyzed and for a specified period of time.

Accredited training provider: A training provider that meets the standards established by EPA to train risk assessors, inspector technicians, lead-based paint hazard control contractors, and workers.

Accuracy: The degree of agreement between an observed value and an accepted reference value; a data quality indicator. Accuracy includes a combination of random errors (precision) and systematic errors (bias) due to sampling and analysis.

Acrylic: A synthetic resin used in high-performance waterborne coatings; a coating whose binder contains acrylic resins.

Adhesion: The ability of dry paint or other coating to attach to a surface and remain fixed on it without blistering, flaking, cracking, or being susceptible to removal by tape.

Administrative removal: The temporary removal of workers before the concentration of lead in their blood reaches levels that require medical removal.

AIHA: American Industrial Hygiene Association.

ALC: See **Apparent Lead Concentration**.

Aliquot: See **Subsample**.

Alkali: A chemical, such as lye, soda, lime, and so on, that will neutralize an acid. Oil paint films can be destroyed by alkalis.

Alkyd: Synthetic resin modified with oil; coating that contains alkyd resins in the binder.

Apparent Lead Concentration (ALC): The average of three or more x-ray fluorescence (XRF) single cycle readings (nominal assay time of 15 to 25 seconds) on a *painted* surface. See **XRF analyzer**.

Bare soil: Soil not covered with grass, sod, or some other similar vegetation. Bare soil includes sand (for example, the sand in sandboxes).

Base substrate: The building material beneath the lead-based paint film. The material may be plaster, wood, brick, or metal.

Bias: A systematic error in the measurement process. For x-ray fluorescence readings, one source of bias is the substrate effect. See **Substrate effect**.

Biennial report: A report, EPA Form 8700–13A, submitted by generators of hazardous waste to the EPA Regional Administrator. The report is due on March 1 of even-numbered years. The report includes information on the generator's activities during the previous calendar year. The owner or operator of a treatment, storage, and disposal facility must also prepare and submit a biennial report using EPA Form 8700–1313.

Binder: Solid ingredients in a coating that hold the pigment particles in suspension and bind them to the substrate. Binders used in paints and coatings include oil, alkyd, acrylic, latex, and epoxy. The nature and amount of binder determine many of the coating's performance properties—washability, toughness, adhesion, gloss, and so on. See also **Pigment**.

Biological monitoring: The analysis of blood, urine, or both to determine the level of lead contamination in the body. Blood lead levels are expressed in micrograms of lead per one-tenth of a liter of blood (a deciliter), or $\mu\text{g/dL}$.

Blank: A nonexposed sample of the medium used for testing, such as a wipe or filter, and analyzed like other samples to determine whether the medium is contaminated with lead before samples are collected (for example, at the factory or the testing site) or whether the samples are contaminated after collection (for example, during transportation to the laboratory or in the laboratory).

Blind sample: A subsample submitted for analysis with a composition and identity known to the submitter but not to the analyst and used to test the analyst's or laboratory's proficiency in conducting measurements.

Building component: Any part of a building coated with paint.

Building component replacement: See **Replacement**.

Cementitious material: A material that is mixed with water, either with or without aggregate, to provide the plasticity, cohesion, and adhesion necessary for the placement and formation of a rigid mass (ASTM Standard C 11).

Certification: The process of testing and evaluating against specifications, the competence of a person, organization, or some other entity in performing a function or service, usually for a specified period of time.

Certified: The designation for contractors who have completed training and other requirements to allow them to safely undertake risk assessments, inspections, and abatement work. Risk assessors, lead-based paint inspectors, and abatement contractors should be certified by the appropriate State or Federal agency.

Certified Industrial Hygienist (CIH): A person certified by the American Board of Industrial Hygiene, who has at least 4 years' industrial hygiene experience and a graduate degree or 5 years' experience and who has passed a 2-day board examination. See also **Industrial hygienist**.

Certified Reference Material (CRM): Reference material that has at least one of its property values established by a technically valid procedure and is accompanied by or traceable to a certificate or other documentation issued by a certifying body.

CFR: See **Code of Federal Regulations**.

Chalking: The photo-oxidation of paint binders—usually due to weathering—which causes a powder to form on the film surface.

Characteristics: EPA has identified four characteristics of hazardous waste: ignitability, corrosivity, reactivity, and toxicity (as determined by the TCLP Test). Any solid waste that exhibits at least one of these characteristics may be classified as hazardous under the Resource Conservation and Recovery Act, depending on how the waste is produced and what quantities are generated.

Chewable surface: See **Chewed surface**.

Chewed surface: Any painted surface that shows evidence of having been chewed or mouthed by a young child. A chewed surface is usually a protruding, horizontal part of a building, such as an interior window sill.

CLC: See **Corrected Lead Concentration**.

Cleaning: The process of using a HEPA vacuum and wet cleaning agents to remove leaded dust; the process includes the removal of bulk debris from the work area. OSHA prohibits the use of compressed air to blow lead-contaminated dust off a surface.

Clearance examination: Visual examination and collection of environmental samples by an inspector technician or risk assessor and analysis by an accredited laboratory upon completion of an abatement project, interim control intervention, or maintenance job that disturbs lead-based paint (or paint suspected of being lead-based paint). The examination is done to assure that lead exposure levels do not exceed standards established by the EPA Administrator pursuant to Title IV of the Toxic Substances Control Act and that any cleaning following such work adequately meets those standards.

Clearance examiner: A person who conducts clearance examinations following lead-based paint hazard control and cleanup work.

Code of Federal Regulations (CFR): The codification of the regulations of various Federal agencies. The regulations are published in the Federal Register.

Cohesion: Ability of a substance to adhere to itself; internal adhesion; the force holding a substance together.

Common area: A room or area that is accessible to all residents in a community (for example, a hallway or a lobby); in general, any area not kept locked.

Competent person: As defined in the OSHA Lead Construction Standard (29 CFR 1926.62), a person who is capable of identifying or predicting hazardous working conditions and work areas, and who has authorization to take prompt, corrective measures to eliminate the hazards. A competent person is not necessarily a risk assessor, inspector technician, or abatement project supervisor.

Complete abatement: Removal or enclosure of lead-based paint in a dwelling and reduction of any lead-contaminated dust or soil hazards. See **Abatement**.

Compliance plan: A document that describes the tasks, workers, protective measures, and tools and other materials that may be used in lead-based paint hazard control to comply with the OSHA Lead in Construction Standard.

Containment: A process to protect workers and the environment by controlling exposures to lead-contaminated dust and debris created during abatement. See **Worksite preparation level**.

Contingency plan: A document that describes an organized, planned, and coordinated course of action during an event that could threaten human health or the environment, such as a fire, explosion, or release of hazardous waste or its constituents from a treatment, storage, or disposal facility.

Contractor: Any business entity, public body, or person performing the actual work on a lead-based paint hazard control project.

Corrected Lead Concentration (CLC): The absolute difference between the Apparent Lead Concentration and the Substrate Equivalent Lead.

Detection limit: The minimum amount of a substance that can be reliably measured by a particular method.

Deteriorated lead-based paint: Interior or exterior lead-based paint that is peeling, chipping, blistering, flaking, worn, chalking, alligatoring, cracking, or otherwise becoming separated from the substrate, or lead-based paint on a damaged or deteriorated surface or fixture.

Digestion blank: A mixture of the reagents used for digesting of paint, soil, or dust matrixes but without the matrix. The blank undergoes all the steps of the analysis, starting with digestion. The blank is used to evaluate the contamination process from a laboratory.

Direct-reading XRF: An analyzer that provides the operator with a display of lead concentrations calculated from the lead "K" x-ray intensity without a graphic of the spectrum. See **XRF analyzer**.

Disposal: The discharge, deposit, injection, dumping, spilling, leaking, or placement of solid or hazardous waste on land or in water so that none of its constituents can pollute the environment by being emitted into the air or discharged into a body of water, including groundwater.

Disposal facility: A facility or part of one in which hazardous waste is placed on land or in water to remain there after the facility closes.

Door mat: See walk-off mat.

Dust removal: A form of interim control that involves initial cleaning intervention followed by periodic monitoring and recleaning, as needed. Depending on the degree of lead-based paint hazards, dust removal may be the primary activity or just one element of a broader effort that addresses lead-based paint hazards.

Dust trap: A surface, component, or furnishing in a house that serves as a reservoir where dust can accumulate.

EBL: See **Elevated Blood Lead level**.

Efflorescence: The salt rising to the surface of a material, which is caused by the movement of water through materials, typically masonry, plaster, or cement. Paint or encapsulants may not adhere to a surface contaminated with efflorescence.

Elastomeric: A group of pliable, elastic liquid encapsulant coatings. An elastomer is a macromolecular material which, at room temperature, is capable of substantially recovering its size and shape after the force that causes the deformation is removed (ASTM D 907, D-14).

Elevated Blood Lead level (EBL): In children, any blood lead level greater than 10 µg/Dl; in adults, any blood lead level greater than 25 µg/dL, as determined by the U.S. Centers for Disease Control and Prevention.

ELLAP: See Environmental Lead Laboratory Accreditation Program.

ELPAT: See Environmental Lead Proficiency Analytical Testing Program.

Encapsulation: Any covering or coating that acts as a barrier between the lead-based paint and the environment and that relies on adhesion and the integrity of the existing bonds between paint layers and between the paint and the substrate for its durability. See also **Enclosure**.

Enclosure: The use of rigid, durable construction materials that are mechanically fastened to the substrate in order to act as a barrier between the lead-based paint and the environment.

Engineering controls: Measures other than respiratory protection or administrative control that are implemented at the work site to contain, control, and/or otherwise reduce exposure to lead-contaminated dust and debris. The measures include process and product substitution, isolation, and ventilation.

Environmental Lead Proficiency Analytical Testing Program (ELPAT): Is a proficiency testing program administered by the AIHA with assistance from the National Institute of Occupational Safety and Health (NIOSH). All laboratories accredited under NLLAP must participate in a proficiency testing program to the ELPAT program is designed to test a laboratory's on-going proficiency in analyzing dust, paint chip and soil samples for lead. (See ELLAP and NLLAP).

Epoxy paint: Paint based on an epoxy resin. An epoxy resin is a cross-linking resin whose reactivity depends on the epoxide group.

Evaluation: Risk assessment, paint inspection, or both.

Examination: See **Clearance examination**.

Examiner: A person certified to conduct clearance examinations or reevaluations.

Exposure monitoring: Sampling and analyzing the air that can be breathed by an employee and the air within the work area to determine the degree of exposure to lead or some other contaminant exposure that can be inhaled.

Exterior work area: Any area such as a porch, stairway, or siding outside a building during lead-based paint hazard control work. This area includes a safety perimeter and access barriers.

Facility: All buildings, contiguous land, structures, and other appurtenances, as well as any improvements, where lead-based paint or hazardous waste is treated, stored, or disposed. A facility may consist of several treatment, storage, or disposal operational units, such as landfills, surface impoundments, or a combination of both.

Federal Register (FR): A daily Federal publication that contains proposed and final regulations, rules, and notices.

Fibermat: A semirigid woven material attached with a liquid adhesive to a surface or substrate.

Field blank: A clean sample of matrix, such as paint, soil, dust, and wipe, carried to the sampling site; exposed to the sampling conditions (for example, by having the bottle caps removed); returned to the laboratory; treated as an environmental sample; and carried through all steps of the analysis. Clean quartz sand, nonlead-containing paint, or a clean wipe could be used as a field blank. The field blank, which should be treated just like the sample, evaluates possible sources of contamination.

FR: See *Federal Register*.

Friction surface: Any interior or exterior surface, such as windows or stair treads, that is subject to abrasion or friction.

Generator: Any person, by site, whose act or operation produces hazardous waste identified or listed in 40 CFR Part 261 or whose act causes a hazardous waste to come under regulation (40 CFR 260.10).

Generator identification number: The unique number assigned by EPA to each generator or transporter of hazardous waste and each treatment, storage, or disposal facility.

Hazardous waste: As defined in EPA Regulations (40 CFR 261.3), the term *hazardous waste* means solid waste or a combination of solid wastes that because of its quantity, concentration, physical, chemical, or infectious characteristics may cause or significantly contribute to increases in mortality or serious and irreversible or incapacitating but reversible illnesses or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed. As defined in the regulations, solid waste is hazardous if it meets one of four conditions: (1) exhibits a characteristic of hazardous waste (40 CFR Sections 261.20 through 262.24); (2) has been listed as hazardous (40 CFR Section 261.31 through 261.33); (3) is a mixture containing a listed hazardous waste and a nonhazardous solid waste, unless the mixture is specifically excluded or no longer exhibits any of the characteristics of hazardous waste; and (4) is not excluded from regulation as hazardous waste. For the waste produced in lead-based paint abatement, hazardous waste is waste that contains more than 5 ppm of leachable lead as determined by the TCLP Test, or waste that is corrosive, ignitable, or reactive and is not otherwise excluded.

Hazardous Waste Manifest: See Manifest.

Heat gun: A device capable of heating lead-based paint to separate it from the substrate. For lead hazard control work, the heat stream leaving the gun above 1100°F (some authorities may use a different temperature).

HEPA filter: See **High-Efficiency Particulate Air filter**.

HEPA/wet wash/HEPA cycle: The cleaning cycle that begins with HEPA vacuuming, followed by a wet wash with trisodium phosphate detergent, some other lead-specific cleaning agent, or any other equally effective liquid cleaning agent, followed by a final pass with a HEPA vacuum over the surface.

High-Efficiency Particulate Air (HEPA) filter: A filter capable of removing particles of 0.3 microns or larger from air at 99.97 percent or greater efficiency.

High phosphate detergent: See **Trisodium phosphate detergent**.

Impact surface: An interior or exterior surface such as those on doors and door jambs subject to damage by repeated impacts.

Incinerator: An enclosed device that uses controlled flame combustion and neither meets the criteria for classification as a boiler nor is listed as an industrial furnace.

Industrial hygienist: A person having a college or university degree in engineering, chemistry, physics, medicine, or related physical or biological science who, by virtue of special training, is qualified to anticipate, recognize, evaluate, and control environmental and occupational health hazards and the impact of those hazards on the community.

In-place management: See **Interim controls**.

Inspection: A surface-by-surface investigation to determine the presence of lead-based paint (and in some cases sampling for lead in dust and soil) and a report of the results.

Inspector technician: An individual who has completed training from an accredited program and been licensed to (1) perform inspections to determine and report the presence of lead-based paint on a surface-by-surface basis through the use of onsite testing, such as by an x-ray fluorescence analyzer or through analysis by an accredited laboratory; (2) report the findings of such an inspection; (3) collect environmental samples for laboratory analysis; (4) perform clearance testing and reevaluations; and (5) document successful compliance with lead-based paint hazard control requirements, or standards.

Interim controls: A set of measures designed to temporarily reduce human exposure or possible exposure to lead-based paint hazards. Such measures include specialized cleaning, repairs, maintenance, painting, temporary containment, and management and resident education programs. Monitoring levels of lead exposures by owners and reevaluation by professionals is an integral element of interim controls. Interim controls include dust removal, paint film stabilization, treatment of friction and impact surface, and installation of soil coverings, such as grass or sod, or land-use controls.

Interior window sill: The portion of the horizontal window ledge that protrudes into the interior of the room, adjacent to the window sash when the window is closed; often called the window stool.

Intermediate controls: Coatings or rigid materials such as encapsulants and floor tiles that prevent lead-based paint from causing excessive lead exposures and that rely on adhesion to the existing paint film for their durability.

Investigation: Determining the source of lead exposure for a child with an elevated blood lead level. Investigation consists of administration of a questionnaire, comprehensive environmental sampling, case management, and other measures.

Investigator: A person who conducts an investigation of a dwelling where a resident has an elevated blood lead level. The investigator must be proficient in interviewing techniques, environmental sampling, and interpretation of risk assessment and environmental sampling data.

Laboratory analysis: A determination of the lead content by atomic absorption spectroscopy, inductively coupled plasma emission spectroscopy, or laboratory-based "K" or "L" x-ray fluorescence.

Landfill: A State-licensed or State-permitted disposal facility that meets municipal solid waste standards (see Federal regulations at 40 CFR 258).

Landfill liner: A continuous layer of natural or synthetic materials, beneath a surface impoundment, landfill, or landfill cell or on its sides. The layer restricts the downward or lateral escape of hazardous waste, hazardous waste constituents, or leachate (40 CFR Part 258).

Latex: A waterborne emulsion paint made with synthetic binders, such as 100-percent acrylic, vinyl acrylic, terpolymer, or styrene acrylic. A stable emulsion of polymers and pigment in water.

Lead: Lead includes metallic lead and inorganic and organic compounds of lead.

Lead-based paint: Any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm² as measured by x-ray fluorescence detector or laboratory analysis, or 0.5 percent by weight (5,000 µg/g, 5,000 ppm, or 5,000 mg/kg) by laboratory analysis. (Local definitions may differ.)

Lead-based paint hazard: A condition in which exposure to lead from lead-contaminated dust, lead-contaminated soil, or from lead-based paint that has deteriorated or coats accessible, friction, or impact surfaces would result in adverse human health effects, as established by the EPA Administrator under Title IV of the Toxic Substances Control Act.

Lead-based paint hazard control: Activities to control and eliminate lead-based paint hazards, including interim controls, intermediate controls, abatement, and complete removal.

Lead-based paint abatement planner/designer: An individual who has completed an accredited training program for planning and designing lead-based paint abatement projects in target housing.

Lead-based paint worker: See **Worker**.

Lead carbonate: A pigment used in some lead-based paint as a hiding agent; also known as white lead.

Lead-contaminated dust: Surface dust in residences that contains an area or mass concentration of lead in excess of the standard established by the EPA Administrator, pursuant to Title IV of the Toxic Substances Control Act. Until the EPA standards are set, the HUD recommendations for leaded dust standards are 100 µg/ft² on floors, 500 µg/ft² on interior window sills and 800 µg/ft² on window troughs for clearance. For risk assessment, the HUD recommendation for window troughs is 3,000 µg/ft². A lead hazard screen recommended standard for floors is 50 µg/ft².

Lead-contaminated soil: Bare soil on residential property that contains lead in excess of the standard established by the EPA Administrator, pursuant to Title IV of the Toxic Substances Control Act. The interim HUD recommendation is 400 µg/g in high-contact play areas, and 2,000 ppm in other bare areas of the yard. Soil above 5,000 µg/g should be abated by removal or paving.

Lead-free dwelling: A lead-free dwelling contains no lead-based paint, and its interior dust and exterior soil have levels of lead below applicable HUD and EPA standards.

Lead hazard screen: A means of determining whether residences in good condition built between 1960 and 1978 should have a full risk assessment using dust sampling and visual survey.

Lead-poisoned child: A child with a single blood lead level measurement of 20 µg/dL or 15 µg/dL or greater for two measurements taken at least one month apart.

Lead-safe dwelling: A lead-safe dwelling meets the following characteristics: (1) leaded-dust window sills, levels on floors, interior and window troughs are below HUD clearance standards (or EPA health-based standards); (2) the lead levels of the bare soil in outdoor play areas are below EPA health-based standards; (3) no deteriorated known or suspected lead-based paint and no deteriorated paint suspected of containing lead is present on any indoor or outdoor surface; (4) a plan has been implemented to ensure that intact lead-based paint or suspected lead-based paint does not become a lead hazard in the course of routine maintenance and renovation; and (5) periodic surveillance is conducted to ensure that these criteria are met for a specific time period.

Lead-specific detergent: A cleaning agent manufactured specifically for cleaning and removing leaded dust or other lead contamination.

Leaded dust: See **Lead-contaminated dust**.

Leaded zinc: A paint primer made from zinc oxide and lead sulfates.

Licensed: Holding a valid license issued by EPA or by an EPA-approved State program pursuant to Title IV of the Toxic Substances Control Act. The license is based on certification for lead-based paint hazard control work. See **Certified**.

Listed waste: A hazardous waste that has been placed on one of three lists developed by EPA: lists of nonspecific source wastes, specific source wastes, or commercial chemical products. The lists were developed by examining different types of waste and chemical products to see if they exhibit one of the four characteristics, meet the statutory definition of hazardous waste, are acutely toxic or acutely hazardous, or are otherwise toxic.

Maintenance: Work to maintain adequate living conditions in a dwelling that may disturb lead-based paint or paint that is suspected to be lead-based paint.

Manifest: The shipping document, EPA Form 8700–22, or a comparable form required by the State or locality used for identifying the quantity, composition, origin, routing, and destination of hazardous waste during its transport from the point of generation to the point of treatment, storage, or disposal. A shipping document used to keep track of items being transported. Hazardous wastes covered by regulations must be accompanied by a manifest. See hazardous waste.

Mat: See walk-off mat

Matrix blank: A sample of the matrix (paint chips, soil, or dust) but without the analyte lead. This sample goes through the complete analysis, including digestion.

MDL: See **Method detection limit**.

Mean: The arithmetic average of data values; for example, the algebraic sum of the data values divided by the number of data values. When using x-ray fluorescence (XRF), the mean is the average of a series of numerical XRF readings.

Medical removal: The temporary removal of workers due to elevated blood lead levels as defined in the OSHA Lead Standard (29 CFR 1926.62).

Method blank: See **Digestion blank**.

Method detection limit (MDL): The minimum concentration of an analyte that, in a given matrix and by using a specific method, has a 99-percent probability of being identified, qualitatively or quantitatively measured, and reported to be greater than zero.

mg: Milligram; one-thousandth of a gram; a unit of weight.

Micrograms: See **µg**.

Milligram: See **mg**.

Monitoring: Surveillance on a continuing basis by a property owner of lead-based paint hazard control measures implemented on a property. In contrast, reevaluation is the visual examination and environmental sampling conducted by a certified risk assessor or certified inspector of target housing units that have undergone abatement or interim control interventions (and clearance tests) to determine if lead-based paint hazards have reappeared. Monitoring *and* reevaluations are needed for interim controls, intermediate controls or encapsulation, and enclosure.

Monofil: A State-approved landfill that accepts only construction debris.

Mouthable surface: See **Chewed surface**.

Multifamily housing: Housing that has more than one dwelling unit in one location.

NLLAP requirements: Requirements specified by the EPA National Lead Laboratory Accreditation Program (NLLAP) in order to be accredited for lead analysis in paint, soil, and dust matrixes by an EPA-recognized laboratory accreditation organization.

Offsite paint removal: The process of removing a component of a building and stripping the paint from the component at a paint-stripping facility.

Ongoing monitoring: See **Monitoring**.

Owner: The entity that possesses a dwelling unit: A person, firm, corporation, guardian, conservator, receiver, trustee, executor, government agency or entity, or other judicial officer who, alone or with others, owns, holds, or controls the freehold or leasehold title or part of the title to property, with or without actually possessing it. This definition includes a vendee who possesses the title, but does not include a mortgagee or an owner of a reversionary interest under a ground rent lease.

Oxidation: A chemical reaction that occurs upon exposure to oxygen. Some coatings cure by oxidation; oxygen enters the liquid coating and crosslinks (attaches) the resin molecules. This film-forming method is also called Air Cure or Air Dry. Oxidation also causes rust to form on metals and paint to chalk.

Paint film stabilization: The process of wet scraping, priming, and repainting deteriorated lead-based paint in a dwelling; the process includes cleanup and clearance.

Paint removal: A strategy of abatement that entails removing lead-based paint from surfaces. For lead-hazard control work this can mean using chemicals, heat guns that produce temperatures below 1100°F, and certain contained abrasive methods but not by open flame burning, open abrasive blasting, sandblasting, water blasting, or extensive dry scraping. (Methylene chloride paint removers are also not recommended.)

Patch test: A test method or procedure to assess the adhesion of an encapsulant coating to a substrate covered with a layer or layers of lead paint.

Periodic surveillance: A series of reevaluations. See **Reevaluation** and **Monitoring**.

Personal breathing zone samples: Air samples collected from the breathing zone of a worker (a 1-foot radius in front of the face) but outside the respirator. The samples are collected with a personal sampling pump operating at 2 liters per minute drawing air through a 37 mm mixed cellulose ester filter (closed face) with a pore size of 0.8 microns. See **Exposure monitoring**.

Personal Protective Equipment (PPE): Equipment for protecting the eyes, face, head, and/or extremities, including protective clothing, respiratory devices and protective shields when hazards capable of causing bodily injury or impairment are encountered.

PHA: See **Public Housing Agency**.

Pigment: Insoluble, finely ground materials that give paint its properties of color and hide.

Pigment Volume Concentration (PVC): Pigment volume as a percentage of total nonvolatile ingredients.

Pilot project: In multifamily housing, testing of a lead-based paint hazard control strategy in a limited number of dwellings, usually those that are vacant, to determine the feasibility of carrying out such a strategy in the entire multifamily housing development; usually involves paint testing, air sampling, wipe sampling, worksite preparation, and a variety of lead-based paint hazard control treatments.

Plastic: See **Polyethylene plastic**.

Polyethylene plastic: All references to polyethylene plastic refer to plastic sheeting or polyethylene bags at least 6 mil thick—or doubled bags if 4 mil polyethylene bags are used—or any other plastic material with a thickness whose performance is equivalent or better. Plastic used to contain waste should be capable of completely containing the waste and after being properly sealed, should remain leak-tight with no visible signs of discharge during movement or relocation of the waste.

Polyurethane: An exceptionally hard and wear-resistant coating made by the reaction of polyols with a multifunctional isocyanate, often used to seal wood floors following cleaning after lead-based paint hazard control work.

Precision: The degree to which a set of observations or measurements of the same property, usually obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed in either absolute or relative terms as standard deviation, variance, or range.

Primary prevention: The process of controlling lead hazards to prevent exposure. See **Secondary prevention** and **Tertiary prevention**.

Primary standard: A substance or device with a property or value that is unquestionably accepted, within specified limits, in establishing the value of the same or related property of another substance or device.

Public Housing Agency (PHA): Any State, county, municipality, or other governmental entity or public body, or agency or instrumentality thereof, authorized to engage or assist in the development or operation of housing for low-income families.

PVC: See **Pigment Volume Concentration**.

Quality Assurance (QA): An integrated system of activities involving planning, quality control, quality assessment, reporting, and quality improvement to ensure that a product or service meets defined standards of quality within a stated level of confidence.

Quality Control (QC): The overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. The aim is to provide a level of quality that is satisfactory, adequate, dependable, and economical.

Random sample: A sample drawn from a population in a way that allows each member of the population to have an equal chance of being selected. Random sampling is used to conduct lead-based paint inspections in multifamily dwellings.

RCRA: Resource Conservation and Recovery Act.

Reevaluation: In lead hazard control work, a visual assessment and collection of environmental samples by a certified risk assessor or certified inspector technician to determine if a lead-based paint hazard control measure that has been implemented is still effective and if the dwelling is still lead-safe.

Reference material: A material or substance that has at least one sufficiently well established property that can be used to calibrate an apparatus, assess a measurement method, or assign values to materials.

Reinspection: See **Reevaluation**.

Removal: See **Paint removal**.

Renovation: Work that involves construction and home or building improvement measures such as window replacement, weatherization, remodeling, and repainting.

Replacement: A strategy of abatement that entails the removal of building components that have surfaces coated with lead-based paint, such as windows, doors, and trim, and the installation of new components free of lead-based paint.

Representative sample: A sample of a universe or whole (for example, waste sample pile, lagoon, groundwater, or waste stream) that can be expected to exhibit the average properties of the universe or whole.

Resident: The person who lives in a dwelling.

Risk assessment: An onsite investigation of a residential dwelling for lead-based paint hazards. Risk assessment includes investigating the age, history, management, and maintenance of the dwelling, and the number of children under age 6 and women of child-bearing age who are residents; conducting a visual assessment; performing limited environmental sampling, such as dust wipe samples, soil samples, and deteriorated paint samples; and reporting the results that identify acceptable abatement and interim control strategies based on specific conditions and the owner's capabilities for controlling identified lead-based paint hazards.

Risk assessor: A certified individual who has completed training from an accredited training program and who has been certified to (1) perform risk assessments; (2) identify acceptable abatement and interim control strategies for reducing identified lead-based paint hazards (3) perform clearance testing and reevaluations; and (4) document the successful completion of lead-based paint hazard control activities.

Sample site: A specific spot on a surface being tested for lead concentration.

Saponification: Chemical reaction between alkalies and oil that produces a type of soap. Because of saponification, oil and alkyd coatings will not adhere to masonry substrates, galvanized metals, or zinc-rich primers. Also a form of incompatibility between types of coatings.

Screening: The process of testing children's blood to determine if they have elevated lead levels.

Secondary prevention: The process of identifying children who have elevated blood lead levels and controlling or eliminating sources of further exposure. See **Primary prevention**.

SEL: See **Substrate Equivalent Lead**.

Site: The land or body of water where a facility is located or an activity is conducted. The site includes adjacent land used in connection with the facility or activity.

Small quantity generator: An owner, contractor (generator), or both who produces less than 100 kg of hazardous waste per month, or accumulates less than 100 kg of hazardous waste at any one time, or one who produces less than 1 kg of acutely hazardous waste per month, or accumulates less than 1 kg of acutely hazardous waste at any one time.

Soil: See **Bare soil**.

Solid waste: As defined in the Resource Conservation and Recovery Act, the term *solid waste* means garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded materials, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. The term does not include solid or dissolved material in domestic sewage or solid or dissolved materials in irrigation return flows or industrial discharges that are point sources subject to permits under the Clean Water Act, nor does the term include special nuclear or byproduct material as defined by the Atomic Energy Act of 1954.

Spectrum analyzer: A type of x-ray fluorescence analyzer that provides the operator with a plot of the energy and intensity, or counts of both "K" and "L" x-ray spectra, as well as a calculated lead concentration.

Spiked matrix: See **Spiked sample**.

Spiked sample: A sample prepared by adding a known mass of the target analyte (for example, leaded dust) to a specified amount of matrix sample (for example, wipe media) for which an independent estimate of target analyte concentration is available. Spiked samples are used to determine, for example, the effect of the matrix on a method's recovery efficiency.

Spot-prime: To apply a paint primer to localized areas of exposed substrate.

Standard deviation: A measure of the precision of the readings; the spread of the deviations from the mean. The smaller the standard deviation, the more precise the analysis, and the less variation there is when an analysis is repeated. The standard deviation is calculated by first obtaining the mean, or the arithmetic average, of all the readings. A formula is then used to calculate how much the values vary from the mean—standard deviation is the square root of the arithmetic average of the squares of the deviation from the mean. Many hand calculators have an automatic standard deviation function.

Standard reevaluation schedule: A schedule that determines the frequency of reevaluations that should be performed on a property. The schedule is based on the lead-based paint hazard control method that is implemented and the existing conditions.

Standard reference material (SRM): A certified reference material produced by the U.S. National Institute of Standards and Technology and characterized for absolute content independent of analytical method.

Subsample: A representative portion of a sample. A subsample may be taken from either in the field or in a laboratory.

Substrate: A surface on which paint, varnish, or other coating has been applied or may be applied. Examples of substrates include wood, plaster, metal, and drywall.

Substrate effect: The radiation returned to an x-ray fluorescence analyzer by the paint substrate or underlying material, apart from any radiation returned by any lead present. This radiation, when counted as lead x-rays by an XRF, contributes to substrate equivalent lead (bias). The inspector may have to compensate for this effect when using XRF analyzers.

Substrate Equivalent Lead (SEL): The average of at least three x-ray fluorescence single cycle readings on an unpainted surface; used to calculate the corrected lead concentration on a surface by the following formula: $\text{Apparent Lead Concentration} - \text{Substrate Equivalent Lead} = \text{Corrected Lead Concentration}$.

Target housing: Any residential unit constructed before 1978, except those developed specifically for the elderly or persons with disabilities—unless any child who is less than 6 years of age resides or is expected to reside in the dwelling—or any dwelling with no bedrooms. In the case of jurisdictions that have banned the sale or use of lead-based paint before 1978, the Secretary of Housing and Urban Development may designate an earlier date defining target housing.

Targeted sample: A sample of dwelling units selected from an apartment building or housing development using information supplied by the owner. The units selected are likely to have the greatest probability of having lead-based paint hazards. A targeted sample is usually selected for performing risk assessments in multifamily housing when it is not possible to select a worst-case sample. See also **Worst-case sample**.

TCLP: See **Toxicity Characteristic Leaching Procedure**.

Tertiary prevention: Medically treating children with elevated blood lead levels.

Toxicity Characteristic Leaching Procedure (TCLP): A laboratory test method to determine if excessive levels of lead or other hazardous materials could leach into groundwater; usually used to determine by its toxicity characteristic if the waste is hazardous.

Trained: Successful completion of a training course on a particular discipline. As applied to lead hazard control work, the course must be accredited by EPA or by an EPA-approved State program, pursuant to Title IV of the Toxic Substances Control Act.

Transporter: A person who transports hazardous waste offsite within the United States by air, rail, highway, or water, if the transport requires a manifest under 40 CFR Part 260.10.

Treatment: In lead-based paint hazard control, a method designed to control lead-based paint hazards. Treatment includes interim controls, intermediate methods, abatement, and full removal. Hazardous waste treatment is a method, technique, or process, including neutralization, that is designed to change the physical, chemical, or biological character or composition of hazardous waste so as to neutralize it, render it nonhazardous or less hazardous, recover it, make it safer to transport, store, or dispose, or allow for easier recovery, storage, or volume reduction.

Treatment, Storage, and Disposal (TSD) facility: A facility licensed to handle hazardous waste.

Trisodium Phosphate (TSP) detergent: Detergent that contains at least 5 percent trisodium phosphate.

Truck-mounted vacuum unit: A vacuum system whose components, except for hoses and attachments, are located outside the building undergoing dust removal. Multiple hoses are used simultaneously and the exhaust is vented to the outside so that the dust inside the building is not disturbed.

TSD: See **Treatment, Storage, and Disposal facility**.

TSP: See **Trisodium phosphate detergent**.

µg (or ug): Micrograms. The prefix micro- means 1/1,000,000 (or one-millionth). A microgram is 1/1,000,000 of a gram and 1/1,000 of a milligram. A microgram is equal to about 35/1,000,000,000 (thirty-five billionths) of an ounce. An ounce is equal to 28,400,000 µg.

Urethane-modified alkyd: An alkyd molecule that has been chemically modified by the incorporation of a urethane. A coating, often a varnish, that uses a urethane-modified alkyd resin in the binder.

Useful life: Life expectancy of a coating before it requires refinishing or some other form of maintenance.

VOC: See **Volatile Organic Compound**.

Volatile Organic Compound (VOC): Substances that vaporize or evaporate from a coating during the coating-curing process.

Walk-off mat: A washable fibrous material preferably with a rubber or vinyl backing positioned at main entryways to reduce transport of lead dust and lead soil into the dwelling interior.

White lead: A white pigment; usually lead carbonate.

Window sill: See **Interior window sill**.

Window stool: See **Interior window sill**.

Window trough: The portion of the horizontal window sill that receives the window sash when the window is closed; often located between the storm window and the interior window sash (sometimes called the window well). If there is no storm window, the window trough is the portion of horizontal window trim that receives both the upper and lower window sash when the sashes are closed.

Window well: See **Window trough**.

Worker: An individual who has completed training in an accredited program to perform lead-based abatement in target housing.

Worksite: A hallway, room or group of rooms, or exterior where a lead-based paint hazard control measure takes place.

Worksite preparation level: A set of measures designed to protect residents and the environment from leaded dust, paint chips, or other forms of lead contamination through the erection of barriers and the establishment of access control, resident relocation or movement restrictions, warning signs, ventilation, and other measures.

Worst-case sample: A sample of dwelling units selected on the basis of a walk-through visual examination by a risk assessor of all dwelling units in a housing development or apartment building to determine which ones are likely to have the greatest probability of containing lead-based paint hazards. See also **Targeted sample**.

XRF analyzer: An instrument that determines lead concentration in milligrams per square centimeter (mg/cm²) using the principle of x-ray fluorescence (XRF). Two types of XRF analyzers are used, direct readers and spectrum analyzers. In these *Guidelines*, the term XRF analyzer refers to portable instruments manufactured to analyze paint only, and does not refer to laboratory-grade units or portable instruments designed to analyze soil.

Appendix B - Model Training Programs - EPA and SOEH

Worker

Target housing and public buildings:

1. Background information and health effects of lead.
2. Sources of environmental lead contamination (paint, surface dust and soil, water, air, food, other).
3. Regulatory background, federal, state and local.
4. Hazard recognition and control.
5. Respiratory protection.
6. Personal hygiene.
7. Lead-based paint abatement and lead hazard reduction methods.
8. Interior dust abatement methods/clean-up or lead hazard reduction.
9. Soil and exterior dust abatement methods or lead hazard reduction.
10. Waste disposal.

Commercial buildings and superstructures:

1. Background information on lead.
2. Regulatory review.
3. Health effects.
4. Medical monitoring.
5. Control methods.
6. Respiratory protection.
7. Work preparation procedures.
8. Personal hygiene.
9. Clean up/waste disposal.
10. Exposure monitoring.
11. Recordkeeping.
12. Other safety and health hazards.
13. Paint removal operations.
 - a. Power tools and miscellaneous
 - b. Abrasive blasting
14. Welding, burning and torch cutting.
15. Mechanical disturbance of lead.

Supervisor

Target housing and public buildings:

1. Background information on lead.
2. Regulatory background, federal, state and local.
3. Legal and insurance issues relating to lead-based paint abatement.
4. Development of pre-abatement work plan.
5. Hazard recognition and control.
6. Respiratory protection and protective clothing.
7. Employee information and training.
8. Project management.
9. Contract specifications.
10. Supervisory techniques.
11. Lead paint abatement or lead hazard reduction including prohibited methods.
12. Interior dust abatement/clean-up or lead hazard reduction.
13. Soil and exterior dust abatement or lead hazard reduction.
14. Soil, dust, and air sampling.
15. Clearance standards and testing.
16. Waste disposal.
17. Community disposal.
18. Cost estimation.
19. Recordkeeping.

Commercial buildings and superstructures:

1. Background information on lead.
2. Sources of environmental lead contamination (paint, surface dust and soil, water, air, food, other).
3. Regulatory background, federal, state and local.
4. Health effects.
5. Identification of lead based paint.
 - a. Historical information
 - b. Limited sampling procedures
 - c. Laboratory analysis
6. Development of de-leading work plan.
7. Medical monitoring.
8. Respiratory protection.
9. Work preparation procedures.
10. Clean up/waste disposal.
11. Exposure monitoring.
12. Environmental monitoring.
 - a. Soil, dust, and air sampling
13. Recordkeeping
14. Other safety and health hazards.
15. Paint removal operations pertaining to superstructures and commercial buildings, including:
 - a. Power tools
 - b. Abrasive blasting
16. Welding, burning, and torch cutting.
17. Mechanical disturbance of lead.

SUGGESTED TRAINING OUTLINE

PROTECTING WORKERS AND THEIR COMMUNITIES FROM LEAD HAZARDS: A GUIDE FOR PROTECTIVE WORKER PRACTICES AND EFFECTIVE WORKER TRAINING

Published by:
SOCIETY FOR OCCUPATIONAL AND
ENVIRONMENTAL HEALTH (SOEH)

Level 1 - Awareness Training (3 hours)

SOEH recommends that building workers and occupants who will not be required to disturb lead-based paint receive awareness training in order to avoid exposure to lead hazards.

This level of training should provide information about: where lead-based paint is (or is assumed to be), the health effects of exposure, the plan being implemented by the building owner, and where records and information can be accessed.

In addition, OSHA requires that workers be trained in the requirements of the OSHA lead standards. 29 CFR 1926.62 (1) (1) (i); and 29 CFR 1910.1025 (1)(1)(i).

Level 2 - Custodial Training (10.5 hours)

SOEH recommends that workers whose tasks are custodial (e.g., sweeping, dusting and vacuuming of building surfaces), receive:

- awareness training
- training in appropriate work practices for clean-up of lead dust
- waste disposal information
- training in the use of respiratory protection
- further information on regulations controlling the handling of lead-based paint.

Level 3 - Maintenance Training (13.5 hours)

SOEH recommends that any custodial, maintenance or building service or other worker who conducts tasks and activities that disturb lead-based paint, receive a level of training that includes all topics covered in the Awareness and Custodial levels, plus:

- lead based paint control methods
- work practices for conducting lead based paint control methods
- use of tools and associated products.

Appendix C - Summary of HUD Guidelines

(1990 & 1995)

Lead-Based Paint Abatement HUD Interim Guidelines, April 18, 1990, Official Revised Edition, September, 1990, (Pages 87, 89 and A14-111 Revised May 1991).

These Guidelines are to provide information on the need for an appropriate method of identifying and abating lead-based paint. The Guidelines are interim and are due to be replaced. The Guidelines apply to Public Housing Authorities (PHA's) and Indian Housing Authorities (HAS's) inclusively.

The Guidelines should be used in conjunction with the requirements of any state or local codes and regulations which may apply to the specific project under consideration. Where state or local codes are more stringent than the Federal Interim Guidelines, the more stringent requirement prevails. None of the procedures outlines in the Guidelines are mandatory except for cases in which the Guidelines cite statutory or regulatory requirements. However, HUD "strongly encourages" their use in lead abatement practice. (Office of Lead-Based Paint Abatement & Poisoning Prevention, HUD)

According to the Guidelines, a level of hazard exists if levels of lead are determined to be as follows:

- 1.0 mg/cm² or higher by portable x-ray fluorescence
- 0.5% by weight or higher by atomic absorption spectroscopy

Lead-based paint hazards must be abated in those buildings covered by the HUD Interim Guidelines if the lead level is 1.0 mg/cm² or greater.

HUD Interim Guidelines include provisions for:

1. Testing and abatement performed under an approved plan.
2. Requirements for reporting results for testing.
3. Maintaining records of testing and assessment.
4. Notification of HUD.
5. Abatement records.

PRE-PUBLICATION COPY
1995 HUD Guidelines
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, and private contractors. Government agencies, sharply reduce children's exposure to lead without unnecessarily increasing to the cost of housing.

The *Guidelines* address lead hazards posed by paint, dusty, 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 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 those involved with housing that has no connection with the Federal Government, and they may be useful hazard control in 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 Native American 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 Native American 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 Department of Labor, and the Centers for Disease Control and Prevention (CDC) of the 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 Urban Development
451 Seventh Street, SW, Room B-133
Washington, DC 20410

I. Childhood Lead Poisoning

Childhood lead poisoning has been labeled by CDC as "the number one environmental health hazard facing American children." Current human evidence shows that 8.9% of all U.S. children have blood lead levels greater than 10 µg/Dl (Perkle, 1994; Brody, 1994) which is CDC's current threshold of concern. 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 1977 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 with 1 mg/cm² or more of lead, 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 surfaces, friction surfaces, 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 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/cm² (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 paint. The prevalence of lead-based paint in housing built before 1940 is especially high after that 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. Hazard Evaluation

Most 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 where dust, soil and paint samples should be collected, 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 where lead hazards are unlikely (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 (or 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 to ensure that leaded dust 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 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," 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 family 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 (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 hazards and make controls more cost-effective.

Whenever building components such as doors and windows are replaced, the *Guidelines* recommended 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 coating 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 outright. 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 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 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 has 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* provides 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 painted with 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 the state of the art 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, 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.

Appendix D - Maintenance Work Request Form

Name: _____ Date: _____

Telephone No. _____ Job Request No. _____

Requested starting date: _____ Anticipated finish date: _____

Address, building, and room number(s) (or description of area) where work is to be performed (Include information on the presence of children, if known): _____

Description of work:

Description of any lead-containing material that might be affected, if known (include location, condition and paint and substrate, and type):

Name and telephone number of requestor:

Name and telephone number of supervisor:

Submit this application to:

(The Designated Person)

_____ Granted (Job Request No. _____)

_____ With conditions*

_____ Denied

*Conditions: _____

Appendix E - Maintenance Work Authorization Form

Authorization is given to proceed with the following maintenance work:

Presence of Lead-Based Paint

- _____ Lead-based paint is not present in the vicinity of the maintenance work.
- _____ Lead is present, but its disturbance is not anticipated: however, if conditions change, the Designated Person will reevaluate the work request prior to proceeding.
- _____ Lead is present and is expected to be disturbed.
- _____ Level 1, 2, or 3 based on amount of lead expected to be disturbed.

Work Practice if Lead-based Paint is Present or Assumed to be Present

The following work practices shall be employed to avoid or minimize disturbing lead:

Personal Protection if Lead-based Paint is Present

The following equipment/clothes shall be used/worn during the work to protect workers:

(manuals on personal protection can be referenced)

Special Practices and/or Equipment Required:

Signed: _____
(Designated Person)

Date: _____

Appendix F - Evaluation of Work Affecting Lead-Based Paint

This evaluation covers the following maintenance work: Location of work (address, building, room number(s), or general description): _____

Date(s) of work: _____

Description of work: _____

Work approval form number: _____

Evaluation of work practices employed to minimize disturbance of lead: _____

Evaluation of work practices employed to contain exposure to lead and to clean up the work area: _____

Evaluation of equipment and procedures used to protect workers: _____

Personal air monitoring results: (both in-house worker and contract)

Worker name _____ Results: _____

Worker name _____ Results: _____

Handling or storage of Lead waste: _____

Signed: _____
(Designated Person)

Date: _____

Appendix G - Waste Tracking Form

Part 1 - To be completed by workers:

Maintenance Work Authorization No. _____

Work Location: Building: _____

Room # or Area: _____

Type of Lead Removed: _____

Quantity of Waste generated: _____

Waste transported to: _____

Transported by: _____

Tracking Form given to: _____

Part 2 - To be completed by Designated Person:

Waste Properly Packaged & Labeled: Yes _____ No _____

EXCEPTIONS: _____

Waste Storage Location: _____

Waste Disposal Location: _____

Hazardous Waste Manifest Received: _____

Date: _____

SIGNED: _____

(Designated Person)

DATE: _____

Appendix H - Sample Information Letter to Tenants/Occupants

MEMORANDUM FOR: Building Tenant Agencies/Occupants

FROM: _____
(Facility Designated Person)

SUBJECT: Notification of the Presence of Lead-based painting

(Facility Name).

As communicated to Building occupants in a memorandum dated, _____ during scheduled renovation of _____ within the building, lead-containing material was identified in _____. The facility was inspected for the presence of lead-based paint by _____.

Upon receipt of the survey results, consultation was entered into with experts in the field of lead detection and control to develop a course of action specifically designed to protect the health and safety of building occupants and the environment. A lead-related Operations and Maintenance (O&M) program was established to provide an effective means for dealing with the lead paint. The objectives of the O&M plan are to:

- establish a program of work practices to maintain lead-based paint in good condition
- ensure the safe clean-up of area previously contaminated
- minimize disturbance and damage
- develop an in-house lead response team to effectively handle emergency situations

Through the establishment of a trained, in-house lead response team and use of experienced outside lead abatement consultants, the lead paint within this facility can be controlled in a manner that will be safe to the health of the building occupants. Of course, the help and cooperation of all tenant agencies and occupants will be needed.

This office will implement a policy of providing informational updates on any activity that will involve the intentional disturbance of lead-containing material during building operations, emergency response to lead releases, and precautions and procedures designed to ensure the health and safety of the building occupants. In addition, information can be gained directly by contacting the office at _____.

Appendix I - Verification of Employee Training

Employee Name: _____

Social Security #: _____

Position: _____

Training Provider: _____

Address: _____

Training Course Title: _____

Date of Course: _____

Length of Course (Hours): _____

Was this Course? Initial: _____ Update Training: _____

Does Course have full approval of U.S. Environmental Protection Agency? _____

Does Employee Participate in Respirator Program? Yes _____ No _____

Does Employee Participate in Medical Surveillance Program? Yes _____ No _____

Attach Copy of Certificate Indicating Successful Completion of Training (including appropriate examination).

Signed: _____
(Designated Person)

Date: _____

Appendix J - Minority Opinions

Minority Opinion

John A. Donnelly, Builders Plans Corporation - Leadfree Home Services

Subject

"Clearance" Levels Applied to Maintenance Task (p.19, ¶3 & p.33, ¶3)

Objection The proposed EPA clearance level for floors (100 µg/ft²) appears to be based on studies of post-abatement conditions. In such cases the floors would be sealed or re-finished and the level is achievable. The 100 µg/ft² level will not be readily achievable, even with multiple cleanings, on many floors without refinishing the floor. It is

beyond the scope of a maintenance document to suggest that the floors may have to be refinished after a maintenance task in order to achieve "clearance".

Recommended Alternative Add a specific and clear statement to the effect that the EPA's (or other) "clearance" levels should not be applied to maintenance tasks indiscriminately.

Minority Opinion

Joseph J. Giamboi, Stroock & Stroock & Lavan
Michael Jawer, BOMA International
James Sharpe, Consolidated Engineering Services

Subject

Scope of risk exaggerated, (p.3, ¶6; and numerous others.)

Objection The Manual repeatedly overstates the scope of risk posed by the presence of lead-based paint, either through statements explicitly made or by presumptions implicit in the document.

Clearly, property owners and managers as well as their maintenance personnel desire sound guidance aimed at minimizing risk during O&M activities that may disturb lead-based paint. It is our opinion that neither the content nor tone of this Manual provide such guidance.

Rationale The proposed manual is based on the presumption that lead is an omnipresent health threat. The opening sentence (p.4, ¶1) states that "Health research has revealed that lead, when swallowed or inhaled, can be harmful to human beings." However, few statements are made subsequently to indicate under what circumstances, in what amounts, or in what condition lead-based paint is known to create a bona fide health risk.

While it is acknowledged that "The mere presence of lead-based paint...does not constitute a hazard" (p.4, ¶2), further statements in the manual belie this point.

An *explicit* example is the statement that “Movement of painted cabinet drawers and doors may... create paint dust and debris” (p.14, ¶3). This suggests that even the simple opening of drawers and doors may involve risk to the occupant. An *implicit* example is that statement that “Buildings constructed prior to 1978 have a higher likelihood of containing lead-based paint than those constructed after 1978” (p.4, ¶3). This carries a much different connotation than saying “Buildings constructed after 1978 have considerably less likelihood of containing lead based paint...” Here, the manual’s choice of phrasing reflects a definite presumption of risk. A document that were less inclined to emphasize unqualified risk -- and more oriented toward precision -- could have stated that “Over 90 percent of the lead added to paint in this century was added before 1955, when the paint industry adopted a voluntary standard limiting the use of lead in interior paints. While buildings constructed between 1955 and 1978 (when the manufacture of lead-based paint was prohibited by the federal government) may contain lead-based paint, examinations have shown that buildings that do contain lead-based paint contain very little.”

Similarly, the statement is made (on p.5, ¶2) that “If testing has not been performed, surfaces painted before 1980 should be assumed to contain lead-based paint.” First of all, the reference to 1980 is inconsistent with the other manual references to 1978 (e.g., on p.4, ¶3). More importantly, numerous well-documented investigations call this contention into question. For example, in a limited screening survey of multi-family housing performed for Fannie Mae in the Washington, D.C. area, only three

properties out of 21 tested revealed lead in the paint. All of these properties were built prior to 1975. Comprehensive testing of two apartment complexes in suburban Maryland, done in 1994, failed to detect any lead-based paint in any of the units tested in the first building (built in 1961), while lead was found only in exterior playground equipment in the second complex (built in 1969). However, the manual in no way references this evidence.

Equally egregious is the statement (p.13, ¶2) that lead-based paint “has been found in houses built after [1978].” While this may be true, the number of such situations is presumably far too low to elicit a valid concern. This is like saying that people may still get an infectious disease after they are inoculated against it. Given that such situations are few and far between, it is certainly not responsible to imply -- as this manual does -- that they are ‘the exception that proves the rule.’

In a 1990 report to Congress the Department of Housing and Urban Development estimated that, in all homes built between 1960 and 1979, only two percent of interior surface area contains lead paint over 1 mg/cm². As HUD is the agency funding this NIBS document, it is especially inappropriate for statements in the manual to repeatedly exaggerate the risks posed by lead-based paint.

Recommended Alternatives Rewrite the guidance to eliminate exaggerated references to the risks posed by the presence of lead-based paint. Put the manual in the context of the minimal risks represented by the various activities described.

**Minority
Opinion**

Joseph J. Giamboi, Stroock & Stroock & Lavan
Michael Jawer, BOMA International
James Sharpe, Consolidated Engineering Services

Subject

Public and Commercial buildings treated similarly to Residential construction.

Objection The manual does not meaningfully convey the vastly lower potential for lead-based paint to represent a problem in public and commercial buildings.

Rationale Public and commercial buildings are distinctly different from residential structures in their much lower potential to contain lead-based paint as well as the vastly diminished likelihood that their occupants are involved in activities which may cause exposure. Rather than emphasizing these differences, however, the proposed manual treats public and commercial buildings in much the same way as it references residential construction.

Exposure to lead-based paint is generally *not* a problem in public and commercial buildings, for two significant reasons:

In pre-1978 buildings, many of the painted surfaces that may have contained lead-based paint are no longer in use, since numerous tenant buildouts and renovations over the years have caused older walls and partitions to be removed. Other walls and partitions have been repainted numerous times with non lead-containing paint.

Additionally, the major high-risk group, children, is not present in public and commercial buildings with the exception of daycare facilities. Unlike residential settings, the likelihood of tracking lead dust into the building is reduced, and even if it were to be brought in on footwear, there is no clear pathway for it to be ingested or inhaled by the two remaining high-risk groups, pregnant women and women of childbearing age.

The lone paragraph that attempts to qualify the nature of lead-based paint in public and commercial buildings (p.27, ¶2) falls well short of conveying that a hazard is *unlikely or generally not found* in these types of facilities. The second sentence reads: “Occupants of public and commercial buildings are less likely to encounter risk of exposure to lead paint contamination than are occupants of residential buildings.” Again, the phrasing reflects a highly debatable view that lead-based paint is an omnipresent problem.

Recommended Alternatives Limit the discussion of public and commercial buildings to those which contain daycare facilities.

**Minority
Opinion**

Joseph J. Giamboi, Stroock & Stroock & Lavan

Subject

Lack of distinction between work practice safety levels.

Objection The manual fails to differentiate relatively safe work activities from more hazardous ones, recommending the full range of performance levels for nearly all work activities covered.

Rationale Twelve of the 16 work practices described in Chapter 6 call for the full range of performance levels. This scheme is not appropriate for the typical user, because it fails to differentiate relatively safe work activities from more hazardous ones. This is a

major shortcoming if a key aim of the NIBS manual is to be understandable and useful for the 'universe' of property owners and managers. Most lack the sophistication and resources needed to implement the recommended guidance. Only the larger firms will actually be able to employ these procedures.

Recommended Alternative Create appropriate distinctions between levels of safety so hazardous work activities are quite clear.

**Minority
Opinion**

Michael Jawer, BOMA International
James Sharpe, Consolidated Engineering Services

Subject

Chapter 4 - Regulations and Guidelines Governing Lead-Based Paint (p.43-60)

Objection This chapter far exceeds what the user needs to know to carry out O&M work.

Rationale The typical reader may well be left confused or intimidated, so that he/she chooses not to have the work done at all or to ignore the regulatory constraints.

Recommended Alternatives This chapter should either be removed or completely revised.

Appendix K - Feedback Form

This form is to be used to provide comments to NIBS concerning use of the **Lead-Based Paint: Operations & Maintenance Work Practices Manual for Homes and Buildings**. Comments and suggestions submitted will be considered during future revisions to the manual. Any relevant data derived from the use of the work practices may be submitted.

Date: _____

Comment applies to section: 1 2 3 4 5 6 Appendix ____

General Procedure (if applicable) 1 2 3

Work Practice (if applicable): _____ Level: 1 2 3

Comment/recommendation: _____

Supporting data or information: _____

Submitted by: _____

Phone: _____

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