Lead-Safe Weatherization Minimum Standards

Crew Training Manual
October 2008

Weatherization Works

U.S. Department of Energy
Weatherization Assistance Program

LSW Minimum Standards Training Curriculum developed in partnership with DOE and in coordination with the DOE Health and Safety Committee, in compliance with Weatherization Program Notice 08-6 (effective date September 22, 2008), by Montana State University Weatherization Training Center, Bozeman, Montana. 2008
Lead is a poison that may be in the paint of homes constructed prior to 1978. For agencies weatherizing these homes, awareness of the hazards of lead in paint and applying lead-safe weatherization is critical to protecting the health of workers, their families and occupants of the weatherized home.

Upon completion of this lesson, you will be able to describe and discuss the following questions:

1. What is lead?
2. Why was lead used?
3. Where can lead be found today?
4. What is a lead paint hazard related to weatherization?
5. How is lead measured in paint, dust and soil?

Estimated Completion Time
This lesson is designed to be completed in 1 hour - this may vary depending upon the amount of optional supplemental material, demonstrations, etc. that are incorporated into the presentation.
WHAT IS LEAD?

Lead is normally thought of as a heavy, durable, soft, gray metal. However, it may also be present in the form of dust or fumes. Due to the heaviness of lead, it tends to settle out of the air in about an hour. Lead does not break down or decay with time. The chemical symbol for lead is Pb, which comes from the Latin word *Plumbum*.

Lead acts as is a poison when introduced into the body. Lead is most dangerous in the form of dust and fumes, which can’t be seen or felt. When lead is dispersed into the air as dust or fumes, it can be inhaled and absorbed through the lungs and upper respiratory tract. Inhalation of airborne lead is generally the most common source of occupational lead absorption. Lead can also be absorbed through the digestive tract if it gets into the mouth and is swallowed. For example, lead dust on a windowsill gets transferred to the hand and then ingested when fingers, food, or cigarettes are placed into the mouth. Young children put their hands into their mouths frequently, so they are at a higher risk of being poisoned by lead.

WHY WAS LEAD USED?

**Lead has been used for centuries.**

**Ancient Egypt**
Lead was mined, refined, and used for sculpting, often as a substitute for bronze. It was also used as a pigment and binder in paints. The Egyptians knew that lead could kill people if they swallowed too much.

**Ancient Greece**
The Ancient Greeks used lead for sculpting. The Greek Physician Nicander was the first person to document the “tortures” of lead poisoning – foaming lips, bloated belly, drooping limbs, and inflamed mouth.

**Ancient Rome**
The Romans were the first to utilize lead for industrial purposes. They used lead pipes for the water supply system. Lead was also used to line goblets. The Romans continued to use lead even though they were aware of lead poisoning.

**The Middle Ages - Europe**
Lead was used by craftsmen and painters, and for industrial purposes (pipes, roof waterproofing membrane). Doctors realized that the health problems of painters, miners, and artists were commonly caused by exposure to lead.
Europe
Throughout Europe, it was widely known that exposure to lead caused serious health problems. In the 1400s, France and Spain prohibited adding lead to wine. “Lead-free” paints were made available to the public by the 1800s.

1900s - United States
Use of lead paint was promoted in advertisements. Many doctors studied and wrote articles about lead poisoning. In 1913, Dr. Alice Hamilton documented the occurrence of “wrist and foot drop” among immigrant workers in Chicago. (MMWR 1999)

Leaded Gasoline. Before 1973, lead was added to gasoline. As it burned, lead was released into the air through the car exhaust. The lead then settled to the ground, polluting nearby soils and water. In 1973, the Environmental Protection Agency (EPA) issued regulations that gradually reduced the amount of lead added to gasoline. By the mid-1990s, the national average level of lead found in children’s blood had dropped by 80 percent (MMWR, 1997). Leaded gasoline is still available in the United States for use in aviation, farm equipment, lawn and garden equipment, logging equipment, industrial and light commercial equipment, construction machinery, recreational vehicles such as all terrain vehicles (ATVs), snowmobiles, and boats, and competitive race vehicles. In countries like Mexico and England, leaded gasoline is still used in automobiles.

WHERE IS LEAD FOUND TODAY?
The characteristics of lead have made it useful for many applications over the years. For instance, lead has been used to make containers and vessels, coins, ornaments, cosmetics, plumbing, paints varnishes, and pesticides as well as a whole host of other products too numerous to mention. Lead paint can be found in homes, schools and other buildings. It can be found on furniture, toys, playground equipment, cars, boats and many other items. Lead paint is used by industries on towers, tanks, bridges, ships and warehouses. Lead can also be found in primers used on metal building components.

Industrial Lead Use. Lead is still used to make batteries, ceramics, lead crystal, bullets, and some plastics. The use of lead in these products can pollute soil, water, and air, and may also contribute to human ingestion of lead. Elevated lead levels can be also found in and around mines and smelters. Lead-based paint is still allowed for industrial use.

Today lead-based paints are used in shipbuilding, on bridges and on steel structures to prevent rust and corrosion. Blasting and grinding of lead-based paint on steel structures is responsible for the creation of huge amounts of lead dust. The dust gets into the air, nearby soils, plants, and water, putting workers and community residents at risk. Additionally, individuals can be exposed to lead
fumes from heated or burned lead-based painted structures. Welders and people using cutting torches on painted metal are examples of people who are at risk of exposure to lead fumes.

**Food.** Food can become contaminated with lead in several ways:
- Plants absorb lead from contaminated soils (vegetables or fruits).
- Use of lead-containing ceramic ware, pottery, and glassware.
- Cans are sealed with lead solder.

**Water.** Lead was used in pipes and solder until the mid-1980’s. Lead from the plumbing leached into the drinking water. The Safe Drinking Water Act (1986 and 1988) made it illegal to use lead in residential plumbing.

**Soil.** Traces of lead can be found in most soils. High levels of lead in soil can come from paint dust, leaded gas exhaust, and industrial releases. Some playgrounds have high levels of lead. Children who play in these areas have an increased risk of exposure to lead, which could poison them. Pets, such as dogs and cats, can transfer the lead from an outside source into our homes. Since lead does not dissipate, degrade or decay, the lead in soil becomes a long-term source of lead exposure. Even though lead emissions from gasoline have been virtually eliminated, an
estimated 4 - 5 million metric tons of lead used in gasoline remain in dust and soil.

**Occupational and Hobby Exposure.** People (including weatherization crews, renovators and contractors) who work with lead-containing materials are in danger of lead poisoning. If not adequately cleaned from the work site, lead dust from their work tools and equipment, shoes, hair and skin may be brought into their work and personal vehicles and then brought home. In this way, workers and hobbyists can expose their families to high lead levels.

### Occupational Exposure
- Weatherization workers
- Steel welders and cutters
- Carpenters
- Renovators
- Plumbers and pipe fitters
- Painters
- Lead crystal makers
- Electronics workers
- Plastic manufacturers
- Wire and cable manufacturers
- Firearm production and use
- Car mechanics
- Printers and artists

### Hobbies
- Home remodeling
- Glazed pottery making
- Target shooting
- Electronics
- Car and boat repair
- Furniture refinishing
- Artistic painting
- Making lead fishing sinkers and lures
- Stained-glass making

## Lead in Housing
Based on the National Survey of Lead and Allergens in Housing, the number of housing units with lead-based paint is as high as 38 million. HUD estimates that 90 percent of privately owned homes built before 1940 contain some lead-based paint. The older the dwelling, the more likely it is to contain lead-based paint. The primary concern for a weatherization program is the use of lead in paints and solid-colored varnishes. Lead was used in paints for several reasons: as a pigment, it made colors more vibrant, made paint more weather resistant, resisted the growth of mold and mildew, and helped prevent corrosion of metal surfaces. Lead was also added to paint to make it dry faster.

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<thead>
<tr>
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<tbody>
<tr>
<td><strong>Lead-Based Paint Percent By Component - Year of Construction</strong></td>
<td></td>
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<tr>
<td>Type</td>
<td>1998</td>
<td>2000</td>
<td>1940</td>
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<tr>
<td>Walls, Floors, Ceilings</td>
<td>2%</td>
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<td>1%</td>
<td></td>
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<tr>
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<td>9%</td>
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<td>2%</td>
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<tr>
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<tr>
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<td>5%</td>
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<tr>
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<tr>
<td>Porch</td>
<td>15%</td>
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<td>7%</td>
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<tr>
<td>Other</td>
<td>18%</td>
<td>0%</td>
<td>8%</td>
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</table>

**Ban of Lead in Pre-1978 Paints.**

Extensive regulatory and educational efforts were undertaken since the late 1970s, including action taken by the Consumer Product Safety Commission (CPSC) to ban most paints manufactured after 1978 containing 0.06 percent or more lead. These actions have dramatically reduced blood lead levels nationwide. Blood lead estimates from the most recent National Health and Nutrition Examination Survey provided evidence supporting this public health achievement. Overall average blood lead levels were reduced by about 78 percent from 1976 to 1991. Although a 1993 CPSC study of consumer paint samples found that paints on the market meet the standard and are actually below the 0.06 percent level, the Commission continues to be concerned about lead that remains in older homes.

The following items were not listed in the 1978 CPSC ban:
- Paint for agricultural and industrial equipment
- Industrial and commercial paints (i.e., traffic marking paint)
- Graphic art paints (used on billboards, road signs, etc.) and paints used by artists
- Touch-up paint for agricultural equipment, lawn and garden equipment, and appliances
- Catalyzed coatings on radio-controlled model airplanes
- Paint on the back of mirrors
- Metal furniture bearing factory-applied coatings
- Items whose lead hazard was not due to lead paint (mini-blinds, crayons, jewelry, and figurines used for game pieces).
- Candle wicks and cosmetics

**LEAD-BASED PAINT HAZARDS in WEATHERIZATION**

Simply looking at a painted surface will not reveal the presence of lead. Although a painted surface
may be intact it still may pose a hazard if disturbed by the occupant or during the weatherization process. A lead-based paint hazard exists wherever lead dust is present in levels that exceed the regulatory standards. However, in the case of weatherization, without testing for the presence of lead in a painted surface it is impossible to know if lead is present; therefore, unless the home has been certified as lead-free, lead-safe weatherization practices must be applied to ALL pre-1978 housing.

Every home and every specific Weatherization measure is unique; therefore the level of protection and containment required to avoid the generation and spread of leaded dust will be based on the hazards present, the age of the home, the scope of work activities, and any customer health issues. Although Weatherization jobs require individual assessments, lead hazards and LSW work generally falls into two containment levels outlined below:

**Level 1 Containment**
Level 1 containment is required in pre-1978 homes when *less than* 6 ft\(^2\) of interior painted surface per room or 20 ft\(^2\) of exterior painted surface will be disturbed.

Level 1 containment consists of methods that prevent dust generation and contains all debris generated during the work process. The containment establishes the work area which must be kept secure. At a minimum, this would include the use of hand tools and applying 6 mil polyethylene sheeting immediately below the work area - extending 5 feet in all directions of the work area to contain dust and debris.

Measures that *may* fall within this guideline include:
- Installing or replacing a thermostat
- Drilling and patching test holes
- Replacing HEPA filters and cleaning HEPA vacuums
- Changing a furnace filter
- Removing caulk or window putty (interior)
- Removing caulk or window putty (exterior)
- Removing weather-stripping

**Level 2 Containment**
Level 2 containment is required when Weatherization activities will disturb *more than* 6 ft\(^2\) of interior surface per room or 20 ft\(^2\) of exterior surfaces in homes built prior to 1978. Level 2 containment consists of methods that define a work area that will not allow any dust or debris from the work area to spread. Level 2 containment requires the covering of all horizontal surfaces, constructing barrier walls, sealing doorways, covering HVAC registers with approved materials, and closing windows to prevent the spread of dust and debris.

Measures requiring level 2 containment *may* include:
Drilling holes in interior walls
Drilling holes in exterior walls, removing painted siding
Cutting attic access into ceiling or knee walls
Planing a door in place
Replacing door jambs and thresholds
Replacing windows or doors
Furnace replacements

Additionally, Level 2 containment must **ALWAYS** be used where any of the following is conducted (even if the activities will disturb less than the hazard de minimis levels within the Level 1 category):

- Window replacement
- Demolition of painted surface areas
- Using any of the following:
  - Open-flame burning or torching;
  - Machines to remove paint through high-speed operation without HEPA exhaust control; or
  - Operating a heat gun at temperatures at or above 1100 degrees Fahrenheit.

**HOW LEAD IS MEASURED IN PAINT, DUST, SOIL AND AIR**
Although the Department of Energy does not require testing before or after the completion of weatherization work, there are circumstances when testing may be needed. In this section we will discuss testing for lead in paint, dust, soil and air.

**Measuring Lead-Based Paint in Targeted Housing**
Target housing is defined as any housing constructed prior to 1978, except housing for the elderly or persons with disabilities (unless a child of less than 6 years of age resides or is expected to reside in such housing for the elderly or persons with disabilities, or any 0-bedroom dwelling.) In the case of jurisdictions that banned the sale and use of lead-based paint prior to 1978, HUD may designate an earlier date. Federal law requires that anyone providing lead-based abatement be properly trained and accredited by the EPA or state agency. “Lead inspectors” and “risk assessors” use specific procedures to measure or sample lead in paint, dust, or soil. Risk assessors also identify the presence of lead-hazards and make recommendations for correcting them. Lead levels are tested in painted surfaces, in dust, and in soils to determine if they exceed EPA and HUD lead standards. EPA defines lead-based paint as any paint, varnish, shellac, or other coatings on surfaces that contains more than 1.0 mg/cm² of lead or more than 0.5 percent lead by weight.

**X-ray Fluorescence (XRF) Analyzer**
An XRF instrument analyzes paint by emitting a radioactive ray. When
the ray hits the paint, the paint returns energy to the XRF in the form of fluorescence (secondary x-ray). The XRF measures the returned energy and computes the amount of lead on the surface. An XRF measures lead in milligrams per square centimeter (mg/cm\(^2\)). One milligram = one thousandth of a gram; one square centimeter is about the size of a thumbnail. Some analyzers can measure dust wipes, soil samples, and air filters to determine the presence of lead.

**Paint Chip Analysis**

Paint chip analysis involves scraping a very small amount of paint off a surface and sending it to a laboratory. Labs generally use atomic absorptive spectroscopy (AAS) to measure the amount of lead in the sample. The laboratory reports the results of the analysis in either mg/cm\(^2\) or in percent lead by weight. In order for the laboratory to report the results in mg/cm\(^2\) the sample must be taken from a precisely measured area so that the amount lead in the sample can be reported in units of mass per area (in this case mg/cm\(^2\)). If sampling from a measured area, it is best to include some of the substrate to insure that the full thickness of paint is included in the sample. If the results are reported by percent lead by weight (mg/kg) the sample is subject to error due to paint being left on or in the substrate, or by getting substrate included in the sample. The American Society for Testing and Materials (ASTM) standard for measuring lead in dried paint samples can be used for more information on this subject.
Spot Test Swabs

Spot test swab kits are available for testing to determine if lead is present in paint. The tests rely on a chemical reaction, which will give a color change when the paint is scratched. These tests cannot be used to determine lead concentrations in paint. These types of tests kits can be affected by the substrate to which the paint is applied. For example, if metals are present in the substrate, it is possible that the test will give a false positive indication. This means the test shows a positive result, indicating lead in the surface, when in fact, the paint is not lead-based paint. Additionally, the color change may be difficult to observe on dark colored paint. While spot test swabs are not currently reliable for DOE Weatherization lead testing, research and refinement of the swabs may make them accurate and permissible for lead testing for DOE weatherization programs in 2009.

Measuring Lead in Dust - Wipe Samples

Most lead-risk studies have shown that lead dust is the main path of lead exposure. Lead dust is measured by taking dust wipe samples. The lead inspector or risk assessor uses moist towelettes to collect dust from a surface.

Samples are taken from floors, windowsills, and sometimes window wells, and then sent to a laboratory for analysis. Results for dust wipe samples are reported in micrograms per square foot. A microgram (µg) is equal to one millionth of a gram.
Section 403 of TSCA, published in the Federal Register on January 5, 2001, is the Lead Hazard Sampling Standard. According to EPA, when lead dust clearance sampling is performed, Section 403 stipulates that the clearance standards that need to be met are as follows:

### Surfaces

<table>
<thead>
<tr>
<th>Surfaces</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors</td>
<td>40 µg/ft$^2$ (25 if a lead hazard)</td>
</tr>
<tr>
<td>Window sills</td>
<td>250 µg/ft$^2$ (125 if a lead hazard)</td>
</tr>
<tr>
<td>Window wells/troughs</td>
<td>400 µg/ft$^2$ (Level for clearance)</td>
</tr>
</tbody>
</table>

#### Measuring Lead in Soil

Lead in soil is a direct and indirect source of lead exposure. It is a *direct source* of exposure when lead from the soil gets onto the hands and then into the body through normal hand to mouth activities. It is an *indirect source* of exposure when it is brought into the home on shoes, clothing, or pets, contributing to levels of lead dust in the home.

Lead in soil is measured by collecting soil samples that are sent to a laboratory for analysis. The results are recorded in parts of lead per million parts (ppm) of soil. Lead becomes immobilized by the organic component of soil, so it is generally retained in the upper 2-5 centimeters of undisturbed soil. Urban soils and other soils that are disturbed may be contaminated to greater depths. According to the EPA, the natural level of lead in soil generally ranges from 5-50 ppm. (EPA, 1995). Soil lead levels within 25 meters of roads typically exceed natural levels by 30-2,000 ppm. Some roadside soils and soils adjacent to houses painted with exterior lead-based paints may have lead levels above 10,000 ppm (EPA, 1986).

#### Measuring Lead in Air

When performing weatherization work that disturbs lead-based paint, the most likely route of exposure for workers is by inhalation of lead dust. The Occupational Safety and Health Administration (OSHA) has established permissible exposure levels for numerous airborne contaminants, including lead. In order to determine worker exposures to lead, an employee exposure assessment and personal air monitoring must be conducted. This type of testing for lead requires the worker to wear a portable sampling pump that pulls air through a filter. The filter must be analyzed by a laboratory to determine lead content. Air testing requires that air pumps be calibrated and start and stop times recorded so that the volume of air pulled through the filter is known so that the laboratory results can be reported in milligrams per cubic meter of air (mg/m$^3$) for comparison with
the OSHA standard.

**Weatherization Worksite Visual Inspection Verification**

Before leaving a weatherization worksite and before the occupants are permitted to access the work-area, visual inspection to verify that the space has been properly cleaned is imperative. Checking the quality of worksite cleanliness is a two-phase process:

- **Phase 1**: Worker visual inspection during the cleaning process; look for any visible paint chips, dust, or debris as you clean, using proper techniques.
- **Phase 2**: Supervisor visual inspection after cleanup. There should be no evidence of settled dust following a cleanup effort. If dust is observed, the Weatherization crew must be required to repeat the cleaning.

If work is done outside the house, the grounds around the dwelling and all exterior horizontal surfaces should also be examined visually to make certain that all waste and debris have been removed and that paint chips were not left behind.

**END of LESSON 1.**

Proceed with Review and Activities
EXERCISE: IDENTIFYING COMMON WEATHERIZATION PRACTICES THAT PRODUCE A LOT OF DUST AND DEBRIS

Directions: In groups of 3 to 5 take 10 minutes to answer the questions below. Assign one person to report your group’s answers to the rest of the class.

Rank the work practice descriptions according to the amount of dust and paint chips you think they make. In the table below, under the column labeled “Rank”, indicate which work practice makes the most dust and debris, followed by the one that makes the second most amount of dust and debris and finally the one that makes the third most amount of dust and debris.
Continue until you have ranked each work practice according to how much dust and debris you think it will make. A smaller number means that you think the work practice will create more dust or debris than a larger number.

If you think some work practices make about the same amount of dust or debris, you can give them the same rank. If you think that each practice makes different amounts of dust, rank them from 1-7.

<table>
<thead>
<tr>
<th>Work Practice Description</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting or planing the bottom of a painted door with power tools</td>
<td></td>
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<tr>
<td>Drilling holes in the side walls to install insulation</td>
<td></td>
</tr>
<tr>
<td>Removing a window for replacement</td>
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<tr>
<td>Removing old caulking or weatherstripping around windows or doors</td>
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<tr>
<td>Re-glazing a window pane</td>
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<tr>
<td>Conducting a blower door test</td>
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<tr>
<td>Replacing a forced air HVAC System</td>
<td></td>
</tr>
</tbody>
</table>

1. For the work practice(s) that you ranked #1, tell why you think it makes the most dust and debris.

2. For the work practice(s) that you ranked last, tell why you think it makes the least amount of dust and debris.

3. If you actually did any of the jobs described above, what would you do to clean up when the job was finished?

**Points for Discussion**
(Comments to the following discussion points are found at the end of this module.)
1. Does it make a difference if there is a lot or a little lead dust generated?

2. Why should weatherization crews be aware of the physical condition of a home before conducting an audit?

3. How does the amount of lead dust generated by weatherization activities depend upon the work practices?
What Is Lead?
- Lead is a heavy metal.
- Lead is a dangerous poison.
- Lead dust settles in about an hour.
- Lead has been used for thousands of years.
- Lead enhances color, resists mold and mildew, prevents corrosion, and makes paints more durable.

Where Can Lead Be Found?
- In paint on/in homes, schools, buildings, furniture, toys, playground equipment, cars, boats, etc.
- Any home built before 1978 may contain lead-based paint.
- The U.S. banned the use of lead in homes in 1978.
- Lead is still in paint used for industrial/commercial purposes.
- Industrial releases are another source of lead exposure.
- Lead was once routinely added to gasoline. Some of that lead remains in the soil today.
- Soil, food, and water may have lead residue or dust.
- Pottery, crystal, cans, glassware, solder and plumbing may contain lead.
- Various jobs and hobbies expose people to lead.

How Is Lead Measured?
- Lead in paint is measured by X-Ray Fluorescence Analyzer or by paint chip samples.
- Lead paint is measured in mg/cm² or in percent lead by weight.
- Title X defines lead paint as: any paint, varnish, shellac, or other coatings that contains 1.0 mg/cm² of lead or more than 0.5 percent lead by weight.
- Lead dust is measured by dust wipe samples.
- Lead dust is measured in µg/ft².

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What Is a Lead-Based Paint Hazard?
- When lead-based paint chips, peels, becomes dust, or fumes.
- When lead-based paint is on chewable surfaces.
- When lead-based paint is on an impact or friction surface.
- When lead is present in dust or soil above the established standards.
- Lead dust is the main source of exposure that leads to lead poisoning.

- Lead dust is created when:
  1. Lead-based paint gets old and deteriorates
2. Lead-based paint surfaces are broken, damaged, or disturbed
3. Lead painted surfaces are sanded or scraped

Points for Discussion
Comments

1. Does it make a difference if there is a lot or a little lead dust generated?
   Without testing we don’t really know how much lead is present in the dust generated by weatherization activities. In all cases, lead-safe weatherization practices must be followed since it is difficult to assess lead levels visually. Even small levels can cause health problems to children and to adults.

2. Why should weatherization crews be aware of the physical condition of a home before conducting an audit?
   Air movement from a blower door or duct blaster may disturb and circulate lead dust throughout the home. If the home has noticeable paint damage (flaking) or there is an appreciable amount of dust, it might be best to defer or delay the project until the condition is corrected.

3. How does the amount of lead dust generated by weatherization activities depend upon the work practices?
   A. Working dry will generate a lot of dust.
   B. Containing dust with plastic and using wet methods will generate less dust.
   C. Containing dust with plastic and using wet methods along with HEPA attached equipment will generate even less dust.
Recognizing the hazards associated with lead-based paint is the first step in protecting workers, and others from potential poisoning. Identifying the signs and symptoms of exposure, the methods available for assessing a hazardous situation, and the procedures to follow when a hazard is encountered may minimize injury or damage. Because lead in dust cannot be seen or smelled, it is possible to ingest or inhale lead and be unaware of it. The hazards in working with lead-based paint do not stop at the work-site; workers have unknowingly carried lead dust home exposing their families, especially their children, to lead poisoning.

In order to fully understand the hazards associated with lead exposure, it is necessary to understand the effects of lead on the body. Upon completion of this lesson, you will be able to describe and discuss the following questions.

1. What is “lead poisoning”?
2. How much lead is dangerous?
3. How does lead get into the body?
4. How does lead harm the body?
5. How are blood lead levels measured?
6. Worker Protection - OSHA

Estimated Completion Time
This lesson is designed to be completed in 1 hour (this may vary depending upon the amount of optional supplemental material, demonstrations, etc. incorporated into the presentation.)
WHAT IS LEAD POISONING?

Lead poisoning refers to the health effects associated with an abnormally high level of lead in the bloodstream. Lead does not affect everyone equally. Management guidelines for blood lead levels in adults differ significantly from management guidelines for blood lead levels in children. Once lead gets into the body, it stays in the blood for several months, and can be stored in the bones for 30 years or more. The more lead a person is exposed to, the greater the chances for lead poisoning. Many small doses of lead over a long period of time can cause lead poisoning as can one large dose of lead in less than a day. A blood test is the only way to find out how much lead exposure has recently occurred and how much lead is in the bloodstream. The amount of lead in the blood is called the blood lead level (BLL). The BLL is measured in micrograms (µg) of lead per deciliter (dl) of blood. A microgram is equal to one piece of a single grain of sugar cut into 1,000 pieces. A deciliter, a volume measure, is equal to a little less than a half a cup. A person weighing 165 pounds has about 60 dl of blood.

Studies show that lead can harm health at blood lead levels of 10 µg/dl and perhaps lower. Imagine that grain of sugar cut into 1,000 pieces. Now picture 10 of those tiny pieces of the sugar grain dissolved in a half cup of liquid. That small amount of lead in the blood can cause significant health problems.
Adult Reactions to Lead
In adults, a blood lead level greater than or equal to 25 µg/dL (micrograms per deciliter) is considered elevated. However, the majority of adults have blood lead levels less than 3 µg/dL. For workers exposed to lead, the Occupational Safety and Health Administration (OSHA) requires the medical reassignment of workers whose blood lead levels reach 50µg/dl or greater. The following chart gives an estimate of an adult’s reaction to different blood lead levels:

<table>
<thead>
<tr>
<th>Blood Lead Level</th>
<th>Possible Health Affects</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µg/dl</td>
<td>Increased blood pressure, harmful effects on a fetus, joint and muscle aches</td>
</tr>
<tr>
<td>25 µg/dl</td>
<td>Reproductive problems</td>
</tr>
<tr>
<td>40 µg/dl</td>
<td>Kidney damage, damage to blood formation</td>
</tr>
<tr>
<td>60 µg/dl</td>
<td>Anemia, nerve damage, constipation, stomach pain, irritability, fatigue, memory and concentration problems, clumsiness, drowsiness and sleep problems</td>
</tr>
<tr>
<td>80 µg/dl</td>
<td>Blue line on gums, uncontrollable shaking of hands, wrist and foot drop, hallucinations, brain damage, coma, and death</td>
</tr>
</tbody>
</table>

(STD 1989)

CHILDREN ARE AT GREAT RISK!
Children can be poisoned by lead very quickly. In children, any blood lead level at or above 10 µg/dL is considered elevated. Since children have a much smaller body mass than adults and absorb more lead, similar exposures between adults and children relate to a much higher body burden of lead in children. Also a child’s rapidly growing brain, nervous system, and body are easily damaged by lead, even by small doses. Children, especially toddlers ages 1-3, are also at a higher risk of lead poisoning because they crawl and play on the floor where lead dust settles and they put their hands and other things into their mouths, thus inhaling and ingesting the lead dust.

Every child could react differently to lead exposure; however, the following chart gives a rough estimate of a child’s reaction to various blood lead levels.

<table>
<thead>
<tr>
<th>Blood Lead Levels</th>
<th>Possible Health Affects</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µg/dl</td>
<td>Loss in IQ, hearing and growth problems. This is the Center For Disease Control, CDC, Level of Concern</td>
</tr>
<tr>
<td>20 µg/dl</td>
<td>Hyperactivity, poor attention span, difficulty learning, language and speech problems, slower reflexes</td>
</tr>
<tr>
<td>40 µg/dl</td>
<td>Poor bone and muscle development, clumsiness, lack of coordination, early anemia, tiredness, drowsiness</td>
</tr>
<tr>
<td>50 µg/dl</td>
<td>Stomach aches and cramps, anemia, brain damage</td>
</tr>
<tr>
<td>150 µg/dl</td>
<td>Swelling of the brain, seizures, coma, death</td>
</tr>
</tbody>
</table>
HOW DOES LEAD GET INTO THE BODY?
There are only two ways that inorganic lead, the type used in lead-based paint, can get into the body: lead is either inhaled or swallowed. There are compounds known as organic leads that can be absorbed through the skin; however, these are not encountered in paints. They are found in solvents, gasoline, etc. The body reads the components of lead much like it does calcium, a harmless and necessary nutrient. Therefore, it readily absorbs and retains lead. This is especially true if the body is lacking in calcium and iron. Up to 50% of the lead that children and pregnant women ingest or inhale is absorbed into their bodies. In contrast, the adult population usually absorbs only 10-15% with the balance excreted.

The major source of lead exposure for children is lead dust.

INGESTION OR INHALATION OF LEAD IS NEVER HEALTHY!

Ingestion = Swallowing lead particles. This is usually in the form of dust through hand-to-mouth transfer.

Inhalation = Breathing in lead particles/dust.

Lead Inhalation
Though not a major pathway of exposure for children, tiny lead particles can be breathed into the lungs. Once these lead particles are in the lungs, they are quickly absorbed into the blood stream.

Lead Ingestion
Lead particles can be swallowed if eating, drinking, smoking, or placing fingers into the mouth takes place without hand washing after coming into contact with lead dust. The particles of lead go through the digestive system and are slowly absorbed into the blood. Lead ingestion that occurs when hands or fingers are placed into the mouth is called hand-to-mouth. For children, hand-to-mouth lead ingestion is often the result of playing in lead contaminated areas such as soil or carpet adjacent to lead painted surfaces. With lead dust in these areas, lead particles may get on toys and children’s fingers and then be transferred into the mouth. Ingestion is the major pathway of exposure for children.

Lead ingestion for most adults is a result of transfer. This occurs as a result of eating, drinking, or smoking after coming into contact with a lead contamination.
Once lead is inhaled or ingested, lead is deposited in the bone marrow where it reduces the body’s ability to produce blood cells.

**Lead has no benefit to the body**

**LEAD IS A POISON!**

**HOW DOES LEAD HARM THE BODY?**

**The Heart and Blood**
Lead attaches to red blood cells preventing them from carrying oxygen and causes them to die sooner than they normally would. Lead also reduces the body’s ability to make new blood cells, resulting in anemia that causes fatigue. Lead poisoning also may cause high blood pressure that increases the risk of heart attack, stroke and kidney disease.

**The Skeletal System**
Lead is deposited in the bone tissue where it reduces the production of new blood cells and competes with calcium. Bones and teeth store 95 percent of the lead in the body. If lead is in the bones instead of calcium, it can be released into the blood when the body needs calcium as often occurs when the body is stressed. Once the lead returns to the blood, it causes damage once again. Lead that stays in the body is called **body burden**.

**The Male Reproductive System**
The direct effects of lead on the male reproductive system are decreased sex drive, erectile dysfunction, infertility and damaged sperm. Additionally, female partners of lead-poisoned workers have more miscarriages and premature births and their children have more birth defects.

**The Female Reproductive System**
As in the male, lead can cause decreased sex drive and infertility in women. In addition, it can cause abnormal menstrual cycles, premature births and miscarriages. Because it is already quickly absorbing extra nutrients for the fetus, a pregnant woman’s body absorbs up to 50% of inhaled or ingested lead. The stress of pregnancy on the body can cause lead to be re-released from the bones, even if the exposure to lead was 20 years earlier. Lead not only makes the woman sick, but causes damage to the fetus as well. Lead affects children by causing birth defects, low birth weights, learning problems and behavioral problems.

**The Nervous System**
The nervous system is the system most affected by lead. Damage to the brain, spinal cord and nerves is permanent. Brain damage can result in depression, irritability, forgetfulness,
clumsiness, and loss of intelligence. At very high doses, lead can cause hallucinations, swelling of the brain, coma and death. Lead damage to nerves usually starts at the hands and feet that may shake or, in severe cases, may become paralyzed. The nervous system of a fetus, infant, or child is affected by even small amounts of lead.

The Kidneys
The kidneys filter out some of the lead in the blood. However, as it is filtered out, the lead damages the kidneys through scarring. Such damage is often not discovered until much kidney function has been lost. Severe lead poisoning can cause kidney failure and result in death.

SYMPTOMS OF LEAD POISONING
Symptoms of lead poisoning may develop quickly but are often not recognized until severe damage has been done. Lead enters the bloodstream and is distributed throughout the body. If not detected early enough, both children and adults are at risk. Symptoms of lead poisoning vary depending on the blood lead level. Low levels of exposure to lead can cause memory and concentration problems, muscle and joint pain, and can affect nervous system function. High levels of lead exposure have been associated with nerve disorders, digestive problems and in extreme cases, death. However, it is important to remember that many individuals show no outward signs of lead poisoning. An individual may have an elevated blood lead level even if they appear healthy and show no signs of lead poisoning.

What are some symptoms of lead poisoning?

Early Symptoms of Lead Poisoning
- Fatigue
- Headaches
- Irritability
- Metallic Taste

Uneasy Stomach
- Poor Appetite
- Weight Loss
- Reproductive Problems

Later Symptoms of Lead Poisoning
- Memory Problems
- Nausea
- Kidney Problems
- Weight Loss
- Constipation
- Weak Wrists or Ankles

Lead poisoning symptoms are frequently mistaken for the indications of a cold or flu virus.
Sometimes these symptoms can come and go for several months, making it difficult for the afflicted person to recognize them as a serious health threat. A child with lead poisoning may appear healthy because the obvious symptoms often do not develop until the condition is serious and permanent damage has been done. Once the lead poisoning has been discovered, the effects of it may be difficult to identify. The following is a list of signs of lead poisoning:

- Tiredness
- Wrist or foot drop
- Sleep problems
- Weakness
- Dizziness
- Clumsiness
- Irritability
- Joint and muscle pain
- Nervousness
- Vomiting
- Headaches
- Loss of appetite
- Difficulty concentrating
- Stomach aches
- Depression
- Constipation
- Forgetfulness
- Metallic taste in mouth
- Hyperactivity
- Numbness
- Increased risk of birth defects

**Incidence of Lead Poisoning**

The National Health and Nutrition Examination Survey (NHANES III) reported a decrease in the number of children with blood lead levels at or above 10 µg/dl (the CDC level of concern) from 1.7 million children in 1988 to 890,000 children in 1994. However, The U.S. Centers for Disease Control (CDC) considers lead poisoning the foremost environmental health threat to children in the U.S. Almost one million children - 4.4% of all pre-schoolers - have enough lead in their blood to reduce intelligence and attention span, cause learning disabilities, and damage permanently a child's brain and nervous system.

Current information from HUD indicates that 38 million homes contain lead-based paint, approximately 26 million homes contain lead-based paint hazards and approximately 6 million of these units house children under the age of six. The major indicators for the presence of lead-based paint hazards in housing are the unit’s age and condition including recent remodeling, rehabilitation or aggressive disturbance of painted surfaces.
Because weatherization programs serve many older homes, lead-safe weatherization practices must be implemented with all homes built prior to 1978.

State Lead Hazard and Child Poisoning Data
Critical information on lead hazards and child lead poisoning is now available on a national web site sponsored by the Alliance to End Childhood Lead Poisoning and Environmental Defense. The web site [www.scorecard.org](http://www.scorecard.org) provides users with information to:

- Determine how many lead poisoned children are known in each state and rank states accordingly.
- Find out how many housing units are likely to have lead hazards in a state, county or census tract.
- Rank states, counties, or census track for lead poisoning risks.
- Make maps showing counties or census tracts with high risks of lead hazards.
- Understand the implications of the most recent national blood lead data.
- Determine hot spots for air lead emissions and lead concentration.
- Find local advocacy groups that are concerned about lead poisoning prevention.

Scorecard reports on lead hazards use a variety of indicators of potential lead exposure. In the absence of local data on blood lead levels in children, these indicators are generally considered by scientists and regulators to be useful for identifying potential problem areas. For comparative purposes, percentage may be a more appropriate indicator than number.

The scorecard web site information should be helpful to State Weatherization Programs as they develop their individual lead-Safe Weatherization State Plan.

**WORKER PROTECTION - OSHA**

Even if DOE and EPA did not have rules dealing with lead exposure to workers implementing Lead-Safe Weatherization, the Occupational Safety and Health Administration (OSHA) is an agency of the Department of Labor which writes and enforces rules protecting workers on the job.

To protect employees from lead hazards, the OSHA Lead in Construction Standard (29 CFR 1926.62) was developed. The Standard became law on June 3, 1993. The OSHA Standard set two legal limits for the amount of lead workers are allowed to breathe.

**Action Level**
The Action Level for lead is 30 micrograms per cubic meter ($\mu g/m^3$). The Action Level is like a yield sign. It means caution!

The Action Level is an average of the amount of lead in the air over an eight-hour period. If the work area has or is expected to have airborne levels of lead at or above 30 $\mu g/m^3$ of air, the employer must
train the workers on the hazards of working with lead and provide special medical exams called medical surveillance.

**Permissible Exposure Level**
The Permissible Exposure Limit (PEL) for lead is 50 μg/m³. The PEL is like a stop sign. It means go no higher!

The employer is not allowed to let workers inhale lead in concentrations of more than 50 μg/m³ of air without proper protection. If the workers are in an area with more lead in the air than the PEL, the employer must reduce the exposure. The PEL is the highest average amount of lead exposure allowed for workers.

**How Much Lead Can Workers Be Exposed?**
The PEL (50 μg/m³) is a very small amount of lead. If one microgram is equal to one thousandth of a grain of sugar and a mailbox has a volume of approximately one cubic meter, the PEL would equal 50 of those tiny sugar fragments (1/1000 of a sugar grain) inside of a mailbox. When performing a task with exposure to lead concentrations of 50 μg/m³ of air or more for a standard eight-hour shift, the worker is at the permissible exposure limit:

One Grain of Sugar ÷ 1000 = One Microgram

The action level and PEL are based on the average level of airborne lead during an eight-hour day. If the exposure to lead is for more than eight hours a day, the action level and PEL must be adjusted.

**OSHA Required Protection and Responsibility.**
The OSHA Lead in Construction Standard states that if exposure to airborne levels of lead is above the PEL, the employer must implement strategies to reduce the exposure. Such strategies include:

- Training on lead hazards
- Work Practice and Engineering Controls
- Protective Clothing
- Change areas
- Washing facilities
- Showers (when feasible)
- Protective equipment
- Respirators
- Medical surveillance

**OSHA Required Training.**
The OSHA Standard requires employers provide training to anyone:
- Working with lead at or above the action level (30 μg/m³)
- Performing any lead-related task that is presumed to expose a worker to lead levels above the action level
- Using lead compounds that cause eye or skin irritation.

The training should cover:
- OSHA Lead in Construction Standard
- Jobs that expose workers to lead above the Action Level
- Information on respirators including uses, types, and the importance of a proper fit
- Medical exams required for everyone working with lead
- Strategies the employer can use to reduce lead exposure

**OSHA Required Work Practice and Engineering Controls.**
Employers produce a compliance program that list in writing the various work practices and engineering controls used to reduce lead exposure. Examples of these types of controls would be:
- Using materials or tools that produce less lead dust or fewer fumes
- Changing the way a job is performed to create less dust
- Rotating schedules to reduce worker exposure to lead
- Providing respirators and protective clothing

**OSHA Required – Workplace.**
The OSHA Standard states that all surfaces are kept as free of lead as possible. Floors and other surfaces must be cleaned with a vacuum using a high efficiency particulate air (HEPA) filter. Shoveling, dry-sweeping, wet-sweeping, and brushing are only used on the job site if vacuuming is proven ineffective [OSHA 1926.62 (h)(3)]. Employers must not allow workers to eat, drink, smoke, chew tobacco, or apply cosmetics in a work area where exposure to lead is above the PEL. They must provide a place where anyone exposed above the PEL can eat and drink safely away from lead.

Whenever working with lead, employers must provide a place for washing and must require employees to wash at the end of each work-shift. The OSHA Standard requires employers to provide a place where anyone exposed above the PEL can change into and out of work clothes (and
If employers decide having a shower is not feasible, they must be able to explain their reasoning to any OSHA inspector who comes to the site. Your employer must post warning signs in the work area where employees are exposed to lead levels above the PEL.

END of LESSON 2.

Proceed with Review

LESSON 2: SUMMARY & REVIEW

What is Lead Poisoning?
- Lead poisoning refers to the health effects associated with an abnormally high level of lead in the blood.
- The signs and symptoms are often mistaken for a cold or the flu.
- Sometimes there are no symptoms at all until the damage is significant.
- Sometimes the symptoms come and go.

How Does Lead Get Into The Body?
Lead dust particles or fumes can be inhaled.
- Lead dust can be ingested by “hand-to-mouth” contact or by transfer.
- Children are at a higher risk because they have more frequent hand-to-mouth contact.
- The major source of exposure for children is lead dust.
- Children and pregnant women absorb up to 50% of the lead they ingest or inhale.
- Adults absorb about 10-15% of the lead ingested or inhaled.

How Does Lead Harm The Body?
- Lead can cause permanent damage, even in small doses.
- Children’s developing brains and bodies are easily damaged by lead.
- Lead can affect EVERY major body system (blood, heart, kidneys, nervous system, bones, and reproductive systems).
- Lead is stored in the blood for approximately 25 days, the soft tissues for 4 days, and in the bones for more than 25 years.
- Lead can be released from the bones during times of stress.
- Lead can cause stillbirths and miscarriages.
- Lead can cause behavioral, developmental, and learning problems in children.

**How Is Lead In The Body Measured?**
- Blood tests determine how much lead is in the blood.
- Results of blood tests are called “Blood Lead Levels”.
- Blood Lead Levels are reported in µg/dl (micrograms of lead per deciliter of blood).

**How Much Lead In The Blood Is Dangerous?**
- The CDC’s “level of concern” for children is 10 µg/dl.
- At 50 µg/dl, OSHA requires that a worker be removed from a lead-related task until Blood Lead Levels are reduced.
Even relatively low lead levels in blood can cause serious health problems.

The website, “Scorecard”, gives critical information on lead hazards and child lead poisoning. It is broken down into state information.

**The OSHA Lead in Construction Standard**

- Protects workers from exposure to lead-hazards.
- AL = “Action Level” 30/μg/m³; “Caution” = training and medical exams must be provided.
- PEL = “Permissible Exposure Limit”; “STOP” = employer must reduce exposure.
- To adjust the PEL, divide 400 by the number of hours of exposure in one workday.
- Employers must provide training to anyone who may be or who has been shown to have been exposed at or above the action level.
- Employers must develop a compliance program that lists in writing all ways they are trying to reduce employee exposure to lead.
Lead-Safe Weatherization (LSW)
Lesson 3: U.S. Department of Energy
Minimum Standards for LSW

Safe Work Practices must be implemented to minimize exposure to hazards for residents and the workers, while allowing Weatherization to occur in a cost-effective manner and to not hinder production. The effort required will be based on the hazard, the work specifications, and customer health issues.

Upon completion of this lesson, you will be able to comply with these LSW minimum standards:
1. LSW Client Protection and Notification
2. Weatherization Worker Protection
3. LSW Work Practice Standards
4. Properly Set-up LSW Containment for Interior and Exterior WX Measures
5. Properly Clean-up a LSW Worksite and Dispose of LSW Debris

Estimated Completion Time
This lesson is divided into five parts:
Part 2. LSW Home Assessment Prior To Weatherization Work
Part 3. House Preparation – Interior and Exterior LSW Setups
Part 4. Lead-Safe Weatherization Measures
Part 5. LSW Cleanup, Verification and Debris Disposal

This lesson is intended to be supplemented with the *Lead-Safe Weatherization Training DVD* segments:
Segment 1 – Introduction to LSW
Segment 2 – Working Safety
Segment 3 - Tools of the Trade of LSW
Segment 4 - Using Shrouds
Segment 5 - LSW Interior Containment
Segment 6 – LSW Exterior Containment
Segment 7 - LSW Clean-up and Disposal

This lesson is designed to be completed in 3 classroom hours; however, it is strongly suggested that this lesson be supplemented with hands-on demonstrations including but not limited to:
- interior containment set-up options using polyethylene sheeting
- exterior containment set-up options
- how to construct drill shrouds
- how to drill siding and interior walls and lift siding
- use and maintenance of HEPA vacuum
- clean-up and disposal practices

NOTES
Part 1.

U.S. DOE MINIMUM STANDARDS FOR LSW - OVERVIEW

Safe Work Practices must be implemented to minimize exposure to hazards for residents and the workers, while allowing Weatherization to occur in a cost-effective manner and to not hinder production. The effort required will be based on the hazard, the work specifications, and customer health issues.

CHECK: Federal, state, and local regulations.
- OSHA has rules for worker safety.
- States and local communities may have rules for waste disposal.

To meet the LSW minimum standards, crews and contractors MUST follow the general principles of working in a lead-safe manner. Best practices for working in a lead-safe manner are available in the benchmark LSW procedures and curriculum and should be reviewed and consistently enforced on LSW jobs.

A. REQUIREMENTS

CLIENT PROTECTION AND NOTIFICATION

Federal law requires that owners and occupants of a house or apartment built before 1978 be notified before weatherization takes place. For homes weatherized before December 22, 2008, owners and occupants of a dwelling built 1978 must receive the pamphlet Protect Your Family from Lead in Your Home (EPA747-K-94-001). For homes weatherized after December 22, 2008, EPA’s new publication Renovate Right: Important Lead Hazard Information for Families, Child Care Providers and Schools (EPA-740-08-002) must be used.

For occupied homes, the Weatherization staff, crew, or contractor must have an adult tenant or homeowner sign an acknowledgement after receiving the pamphlet. The pamphlet can also be sent by certified mail with receipt to be placed in the customer file.
In multi-unit housing, the agency must:

- Provide written notice to each affected unit (notice must describe: general nature and locations of the planned renovation activities; the expected starting and ending dates; statement of how occupant can get pamphlet at no charge); or
- Post informational signs (signs must describe general nature and locations of the renovation and the anticipated completion date) and post the EPA pamphlet. (If pamphlet is not posted then agencies are required to provide information on how interested occupants can review a copy of the pamphlet or obtain a copy at no cost from the Weatherization Program).
- Delivery to owner/occupant. Owner’s and/or occupant’s signature with acknowledgment or certificate of mailing. The owner/occupant must acknowledge receipt of the EPA pamphlet prior to start of renovation that contains the address of unit undergoing renovation, name and signature of owner or occupant, and the date of signature. It must be in same language as “contract for renovation” for an owner-occupied (or the same language as the lease for occupant of non-owner occupied) target housing.

If the Weatherization Program cannot get a signed acknowledgment (either the occupant is not home or refuses to sign the form), then the self-certification section of the form must be signed to prove delivery.

**Record Keeping Requirement.** The acknowledgement form must be filed and remain with the client file for three years from date of signature.

**Discussing LSW with Clients.** In addition to providing a copy of the pamphlet to owners and occupants, designated local agency staff (e.g., intake specialist, auditor, crew chief) **must discuss the hazards associated with lead-based paint and lead dust, and describe how they will conduct LSW in the home.** This discussion should include:

- Describing how residents’ possessions will be protected from further lead dust contamination.
- Identifying the activities residents are expected to perform before the work begins.

It is much easier to prevent possible problems during set-up than to do extra cleaning afterward. Residents may be asked to move some items before work begins. This includes moving any furniture and fixtures out of the work area and storing them away from any work that may create dust. Seal over remaining items with polyethylene protective sheeting where possible. Moving items such as draperies, area rugs, and plants will reduce the potential for contaminating them with lead dust. If the paint in the work area has already deteriorated, suggest that the residents clean these items prior to moving them to other areas of the house to minimize the amount of lead dust that is distributed to other areas of the house. Additionally, if the residents move and clean these items before the weatherization work begins, there is less worry about being held responsible for damaged or lost items.
Sample Confirmation of Receipt of Lead Pamphlet

**Confirmation of Receipt of Lead Pamphlet**
I have received a copy of the pamphlet, *Protect Your Family From Lead in Your Home*, informing me of the potential risk of the lead hazard exposure from renovation activity to be performed in my dwelling unit. I received this pamphlet before the work began.

Printed name of recipient                      Date

Signature of recipient

**Self-Certification Option (for tenant-occupied dwellings only)**
If the lead pamphlet was delivered but a tenant signature was not obtainable, you may check the appropriate box below.

☐ **Refusal to sign**--I certify that I have made a good faith effort to deliver the pamphlet, *Protect Your Family From Lead in Your Home*, to the rental dwelling unit listed below at the date and time indicated and that the occupant refused to sign the confirmation of receipt. I further certify that I have left a copy of the pamphlet at the unit with the occupant.

☐ **Unavailable for signature**--I certify that I have made a good faith effort to deliver the pamphlet, *Protect Your Family from Lead in Your Home*, to the rental dwelling unit listed below and that the occupant was unavailable to sign the confirmation of receipt. I further certify that I have left a copy of the pamphlet at the unit by sliding it under the door.

Printed name of person certifying lead pamphlet

Attempted delivery date and time

Signature of person certifying lead pamphlet delivery

Unit Address

**Obtaining Copies of Lead Pamphlets**

To obtain copies of:
*Protect Your Family from Lead in Your Home* (EPA747-K-94-001)

*Renovate Right: Important Lead Hazard Information for Families, Child Care Providers and Schools* (EPA-740-08-002)
WEATHERIZATION WORKER PROTECTION

Lead-based paint can pose a threat to weatherization workers (including contracted contractors) by causing damage to their brains, nervous and reproductive systems. Respirator protection and other personal protective gear is required by OSHA and DOE. By adopting basic safety precautions, weatherization programs can protect their workers and the occupants of the homes they weatherize from lead exposure.

LSW includes these procedures and safety precautions:

Respiratory Protection.
Compliance with the Lead in Construction Standards (1962-62) including Air Monitoring requirements of the U.S. Department of Labor - Occupational Safety & Health Administration (OSHA), requires different types of respirators rated for use around lead if exposures are high.

Unless approved OSHA personal air monitoring has been conducted by a weatherization program which verifies that respiratory protection is not necessary, all weatherization workers applying LSW measures must wear fit-tested respiratory protection, such as a ½ face NIOSH (National Institute for Occupational Safety and Health) approved respirator with HEPA (P-100/magenta) filters, to prevent them from breathing leaded dust.

OSHA also requires all contractors using respirators to implement a respiratory protection program, which includes routine education and monitoring of workers.

Disposable Protective Clothing.
Disposable head coverage (painter’s hat or overall hood). Painter’s hats are an inexpensive way to keep dust and paint chips out of workers’ hair. Painter’s hats can be easily disposed of at the end of the day with other LSW debris.

Disposable overalls with or without hood and foot covering (Tyveks® or polyspun suits) are a good way
to keep dust off of workers’ clothes and reduce the chances for carrying dust to other areas of the residence as workers come and go. The overalls can be removed when workers leave the work site and stored in a plastic bag overnight. To keep costs down, consider buying extra large size overalls in bulk and sizing to fit workers with duct tape. Protective coverings should have as few loose openings as possible. It is recommended that they have elastic bands around the ankles and wrists (or use of duct tape to secure the overalls around the ankles and wrists) and they should have attached hoods or a tight fitting collar. Overalls with hoods will help keep contaminated dust out of workers’ hair.

Washable jumpsuits and uniforms may be more comfortable and cost-effective than disposable ones. Make sure that your work clothes are thoroughly vacuumed with a HEPA vacuum each time you leave the work area. These should be laundered at a facility equipped to wash contaminated clothing.

Unless covered with protective overalls do not wear the clothes you worked in home. If there is nowhere to change on the job, thoroughly vacuum clothes with a HEPA vacuum before leaving the job site. Upon arriving home, remove clothes in the shower (without the water running) or in the garage where the floor can be washed down easily. Don’t mix work clothes with other household wash items -- wash them separately.

Heat Stress Warning

Please be aware that workers in hot weather may be prone to heat stress, including heat exhaustion and heat stroke. These and other heat related health issues may be exacerbated by the wearing of protective clothing. Workers should be provided with adequate breaks, constant availability of water and other re-hydrating liquids and should be trained to take precautions and avoid heat related illness. Heat stress can be life threatening and in all cases local, state and Federal regulations should be followed including OSHA guidance.

Shoe or boot covers (disposable booties). Wearing disposable shoe/boot covers is a good way to keep from tracking dust to other parts of the house, but remember to remove, clean, or replace them before you step off of the poly sheeting onto a non-contaminated area. If possible, change out of work shoes/boots before returning home.

Disposable wipes for personal cleaning. Workers should wash their hands and faces periodically during the workday to avoid ingesting leaded dust. It is especially important to wash well before eating, drinking or smoking and to not do any of these at the work site. Some of the dust that settles on the face around the mouth invariably finds its way into the mouth. Workers should also wash at the end of the day before getting in their car and going home. They can take leaded dust home to their families.
Disposable hand towels (such as paper towels) and pre-moistened wipes have multiple uses on the job. They can be used to quickly clean surfaces, to wipe off dust before leaving the work site and washing before eating, smoking, or drinking.

**Eye Protection and Work Gloves.** Weatherization work utilizes materials and tools that have potential to generate dust, particles and come in contact with sharp surfaces and objects. To provide eyes and hands from work hazards, weatherization workers should use appropriate eye protection and gloves.

**Other Weatherization Protection Requirements:**
- Keep dust to a minimum and properly contain dust and paint chips to the work area. Tack pads immediately adjacent to the work areas can help minimize the spread of dust from shoes.
- Clean up area during and after work.
- During Weatherization, wash your hands and face frequently, particularly when leaving the work area and especially before leaving the area for the purpose of eating, drinking, or smoking.
- Before leaving a confined work area, remove your protective clothing and protective shoe/boot covers to avoid exposing others.
- Before leaving a confined work area, and before returning tools and equipment to vehicles, clean all tools to avoid exposing others and creating a lead-hazard to the next weatherization job.
- Get annual medical exams to check blood lead levels. Do non-lead-related work if your blood lead level gets too high.
- Inform your employer if you develop signs of lead poisoning.

### B. GENERAL LSW WORK PRACTICE STANDARDS

**Work Area Preparation**
- Crews and contractors must take steps to protect occupants from lead-based paint hazards while the work is in progress using appropriate containment strategies.
- Occupants, especially young children or pregnant women, may not enter the work site. Occupants are allowed to return only after the work is done and the home has passed a visual inspection.
- Occupants’ belongings must be protected from lead contamination. This can be done by removing them from the work area or covering them in protective bags (minimum 2 mil. polyethylene sheeting) and sealing using duct-tape it to prevent
dust from getting on the items. If the item has an open base and is too heavy or large to move for cleaning, seal it to avoid dust from getting under it.

- For certain weatherization measures the work site must be set up with containment plastic to prevent the spread of leaded dust and debris.

- Ensure that containment does not interfere with occupant and worker egress in an emergency.

- Warning signs must be posted at entrances to the worksite when occupants are present; at the main and secondary entrances to the building; and at exterior work sites. The signs must be readable from 20 feet from the edge of the worksite. Signs should be in the occupants’ primary language, when practical.

- Most LSW work areas must be contained. If containment can not be achieved with occupants in the unit (e.g., work will take several days and involves the kitchen, bathrooms, or bedrooms that can not be sealed off from use), occupants must move out of the unit or the work must be deferred until containment can be achieved.

**Prohibited Work Activities**
The following are prohibited work activities related to weatherization when working in pre-1978 homes:

- **NEVER** - use reusable cloth or fabric, such as a painter’s drop cloth, as protective containment sheeting. Polyethylene and in some cases when working on the exterior garden fabric are the only acceptable protective containment sheeting and must never be reused.

- **NEVER** - use brooms and shop vacuums for cleanup. Wet cleaning and HEPA vacuums are the only acceptable methods for cleanup.

- **NEVER** – use a conventional shop vacuum with HEPA filters – only HEPA-designed vacuums are acceptable for LSW.

- **NEVER** - turn leaded paint into leaded dust by dry scraping or sanding (unless needed around electrical outlets) or grinding, abrasive blasting or planning.

- **NEVER** - use an open-flame torch or heat gun (above 1100°F) to remove paint or window glazing. Open flame/high heat methods to remove paint create fumes that are dangerous for workers to breathe. Small lead particles created by burning and heating also settle on surrounding surfaces and are very hard to clean up.

- **NEVER** - smoke, eat, drink, chew tobacco or gum, or apply cosmetics

- **NEVER** - track leaded dust from the LSW work area into a clean area

- **NEVER** – leave work debris or dust for the client to clean up or use client’s vacuum, broom or dustpan for cleanup

- **NEVER** - change HEPA filters in the residence

- **NEVER** – take lead into your work vehicle and home – clean yourself and tools before leaving the work area

- **NEVER** – use hazardous volatile paint strippers (including methylene chloride) in an inadequately ventilated space
**Note Regarding Chemical Strippers.** Chemical strippers can be dangerous and should be used with great caution. Some can cause burns. Methylene chloride is suspected to cause cancer. Types of strippers range from citrus-based (safer) to more dangerous caustic strippers. Use of chemical strippers may trigger additional training, notification, and record keeping requirements under the OSHA Hazard Communication Standard. Follow the manufacturer’s directions when using any chemical stripper. If building components to be stripped can be removed, such as doors, consider having them stripped off-site at a paint stripping facility. Half-face negative-pressure respirators do not provide sufficient breathing protection when using methylene chloride strippers.

**Blower Door and Duct Blaster Caution.** If it is visibly apparent that paint is chipped or flaking from interior surfaces of a home built before 1978, it is likely that lead dust is in the heating and/or air conditioning duct work. Workers conducting weatherization audits should be aware that blower door and duct blaster diagnostic procedures may increase lead hazards by spreading lead dust throughout the house.

NEVER use an open-flame torch or heat gun (above 1100°F) or

**C. CONTAINMENT**
Containment is anything that stops any dust or debris from spreading beyond the work area to non-work areas. The level of containment must be determined by the auditor or supervisor before work is assigned to a crew or contractor.

For 2010, to comply with EPA’s LRRPP Rule requirements, a Certified Renovator will be required at the jobsite to assess and set up the containment site.

- NEVER - allow residents and pets access to the work area while work is underway.
- NEVER - open windows and doors allowing lead dust to float into other parts of the building or outside.
- NEVER - allow furniture and other objects to remain in the Weatherization work area while Weatherization work is being performed unless they are covered and sealed in polyethylene sheeting or bags.

Every home and every specific Weatherization measure is unique; therefore the level of containment required will be based on the hazards present, the age of the home, the scope of work activities, and any customer health issues. Although Weatherization jobs require individual assessments, LSW work generally falls into two levels of containment and the related standards are outlined below.

**Level 1 Containment**

Level 1 containment is required in pre-1978 homes when less than 6 ft\(^2\) of interior painted surface per room or 20 ft\(^2\) of exterior painted surface will be disturbed. Level 1 containment consists of methods that prevent dust generation and contains all debris generated during the work process. The containment establishes the work area which must be kept secure.

Measures that may fall within this guideline include:
- Installing or replacing a thermostat
- Drilling and patching test holes
- Replacing HEPA filters and cleaning HEPA vacuums
- Changing Furnace Filter
- Removing caulk or window putty (interior)
- Removing caulk or window putty (exterior)
- Removing weather-stripping

Keep in mind that although these projects are generally small, depending on the types of tools that are used (use a power tool versus use of hand tools) and the height of the weatherization measure (such as cutting in a ceiling attic access); lead dust will be generated and can spread beyond a small area. Therefore when considering the level of containment, remember that clean-up is required after completing all weatherization activities using a HEPA vacuum and wet methods (described in Part 5 of this lesson). To assure proper clean-up following the project, applying minimum levels of containment is
recommended even if less than 6 ft² of interior painted surface per room or 20 ft² of exterior painted surface will be disturbed. For interior projects, level 1 containment may include laying out 6 mil plastic on the floor or masking off of window or door adjacent to the project. For small weatherization measures, using wet cutting and drilling techniques and using hand tools inside of power tools is also advisable.

**Level 2 Containment**

Level 2 containment is required when Weatherization activities will disturb *more than 6 ft² of interior surface per room or 20 ft² of exterior surfaces in homes built prior to 1978.*

Level 2 containment consists of methods that define a work area that will not allow any dust or debris from work area to spread. Level 2 containment requires the covering of all horizontal surfaces, constructing barrier walls, sealing doorways, covering HVAC registers with approved materials, and closing windows to prevent the spread of dust and debris.

Measures requiring level 2 containment *may* include:
- Drilling holes in interior walls
- Drilling holes in exterior walls, removing painted siding
- Cutting attic access into ceiling or knee walls
- Planing a door in place
- Replacing door jambs and thresholds
- Replacing windows or doors
- Furnace replacements

Additionally, Level 2 containment must *ALWAYS* be used where any of the following is conducted (even if the activities will disturb less than the hazard de minimis levels within the Level 1 category):
- Window replacement
- Demolition of painted surface areas
- Using any of the following:
  - Open-flame burning or torching;
  - Machines to remove paint through high-speed operation without HEPA exhaust control; or
  - Operating a heat gun at temperatures at or above 1100 degrees Fahrenheit.

**Use Lead-Safe Work Techniques**

The goal of LSW is not to generate lead dust and debris and spread existing or generated lead when applying weatherization measures. Since weatherization measures require drilling, cutting and removal of building materials (such as siding, windows, doors, etc.) DOE requires that weatherization crews control lead dust by implementing these LSW practices:

1. **Work Clean:**
- Scoring paint before separating components helps prevent paint from chipping when a paint seal is broken.

- Prying and pulling apart components is a cleaner work practice. Pulling nails instead of pounding creates less dust and fewer paint chips. Vise grips may be useful when pulling nails.

- On-going clean-up during the work using HEPA vacuum* and wet cleaning methods helps keep lead dust from spreading. The proper disposal of lead debris keeps lead dust from being brought back into the home.

* HEPA Vacuum NOTES:
1. “HEPA” stands for “high efficiency particulate air” filter. By definition, a HEPA filter capture 99.97% of particles that are 0.3 microns or larger in diameter.
2. Conventional shop vacuums with a HEPA filter must not to be used for LSW.

2. Work Wet: Mist surrounding surfaces with water before and during drilling and cutting to reduce dust creation and keep dust from becoming airborne and spreading beyond the work area. You might also consider placing foam (such as shaving cream) on the surface when cutting or drilling. When using wet methods, employees must be extremely careful to avoid electrical shock and electrocution hazards. Using power tools on heavily misted surfaces can be dangerous since blades can slip and water can cause electric shock. Therefore, battery-powered equipment is recommended. Avoid the wet method when working within one foot of an electrical outlet. Ground fault circuit interrupters (GFCIs) must be used when working around sources of electricity to prevent possible electric shock injuries.

Experience indicates that working wet is most useful when dealing with limited areas and small tasks. One problem is that water and foams act as cleaners and can mark walls and other surfaces with unsightly smears and drips. Also using water and foams on exterior surfaces in cold climates has limited applications. Therefore, HEPA vacuums attached to power tool equipment is more appropriate than wet methods in many cases and especially in situations where high production is needed.

Working wet – water mist or shaving cream
4. Use HEPA Attached Power Tools with Shrouds
Because wet methods have limitations, power tool with shrouds attached to HEPA vacuums are effective for large LSW jobs like drilling insulation holes and cutting with reciprocating saws. Shrouded tools connected to HEPA vacuums help contain dust and debris as they are created. Use of these tools increases productivity but if not securely connected and sealed to the HEPA vacuum they can still spread lead dust. For proper suction of debris into the HEPA vacuum is it also important that suction hoses are not extended beyond those provided by the vacuum manufacturer. When working in high places that would require a longer hose connection to the HEPA vacuum a waist or shoulder portable connected vacuum provides an effective alternative to the canister type of vacuum. Since shrouds for power tools are not readily available innovative weatherization agencies have fabricated home-made adaptors for drills and reciprocating saws.

Fanny-pack style HEPA vacuum

Drill with DIY-made HEPA-attached shroud.
D. PROPER LSW CLEAN-UP AND DEBRIS DISPOSAL

Following the containment standards in the previous section will minimize the level of effort required to properly clean up the job site. All dust, dirt, material scraps, containers, wrappers, and work related debris must be removed from the customer’s home. A HEPA vacuum should be used to clean up the work areas. Further cleaning may be necessary based on the hazard.

At the conclusion of the job, once all workers have “cleaned” the work areas thoroughly, Weatherization workers must adhere to the following:

Safe and Secure Disposal

- Bag and gooseneck-seal all waste in 6-mil plastic bags
- Safely dispose of all waste in accordance with federal, state, and local regulations

Visual Inspection Verification

Checking the quality of worksite cleanliness is a two-phase process:

- Phase 1: Worker visual inspection during the cleaning process; look for any visible paint chips, dust, or debris as you clean, using proper techniques.
- Phase 2: Supervisor visual inspection after cleanup. There should be no evidence of settled dust following a cleanup effort. If dust is observed, the Weatherization crew must be required to repeat the cleaning.

If work is done outside the house, the grounds around the dwelling and all exterior horizontal surfaces should also be examined visually to make certain that all waste and
debris have been removed and that paint chips were not left behind.

For 2010, to comply with EPA's LRRPP Rule, cleaning verification using EPA-developed cards will be required. EPA expects to have them widely available in late 2008/early 2009; however, using verification cards is not a requirement until 2010.

Specific steps are required of the Certified Renovator during the cleaning verification and are addressed in the EPA LRRPP Rule.

PART 2

HOUSE ASSESSMENT PRIOR TO WEATHERIZATION WORK

For any weatherization project, a site visit is conducted to provide an opportunity to visit with the client and to look for health and safety items that may disqualify the residence or delay work from being completed. Some of these might be Hanta Virus concerns, asbestos, structural integrity and possible lead-based paint.

Evaluating the House for Lead-Based Paint

There are a number of reasons why it should be determined if the job will create lead dust prior to starting work. These include:

- Ensuring the activities will not create additional hazards or potential liabilities from lead dust.
- This is an opportunity to indicate specific lead dust control activities in your work schedule and the use of appropriate lead-safe weatherization practices.
- Having materials and equipment on hand to safely manage lead dust, minimize the amount of dust created, and reduce the potential for spreading dust to other parts of the dwelling or surrounding area.
- Accurately estimating the costs of the additional time, labor, and supplies to perform lead-safe weatherization.
- Making sure that workers are qualified for the job.
- Developing a list of any specific issues and preparing to discuss them with owners and occupants prior to the inception of work.

Was the Home Constructed Prior to 1978?

Many houses constructed before 1978, especially those constructed prior to 1960, contain some lead-based paint. If the property was constructed after 1978, there is no need to perform lead-safe weatherization practices. The resident should be your first source for this information. They can get information on the age of the property from tax records or
property deeds. Unless otherwise documented, always assume that painted surfaces from pre-1978 houses contain lead-based paint and that all dust generated from these surfaces may contain lead.

**Has any prior renovation work been done?**

If a new home was added to a pre-1978 addition it is required that if the weatherization work that is being done is in the pre-78 addition, LSW must be applied.

**Has a lead evaluation been conducted (applicable for federally funded properties)?**

Lead evaluations cover a range of activities that test for lead-based paint. If the owner has documentation that an EPA or state certified inspector or risk assessor performed a lead evaluation and found that no lead-based paint is present in the work area, workers do not have to utilize lead-safe weatherization practices, regardless of the age of the property.

**Will the work disturb painted surfaces that may contain lead?**

All weatherization activities that disturb painted areas, including scraping paint, removing siding, drilling, and replacing windows, will create some dust. Additionally, some areas such as window troughs and loose areas near a building’s foundation typically accumulate dust and paint chips. Consider these factors when approaching the job and develop an appropriate plan to deal with the potential lead dust. If the work will not disturb any painted surfaces or areas where lead dust can accumulate, lead-safe weatherization practices do not have to be used.

**If the WX project creates high dust levels?**

Certain projects such as removing siding, windows, or doors, can create high dust levels. Additionally, surfaces with deteriorated or chipped paint are more likely to generate high levels of dust than intact surfaces. The level of dust a job will create directly affects other parts of the job, including the materials and equipment required, precautions taken during set up, and the control methods used. Remember, the larger the job, the greater the amount of dust you generate requires a higher level of containment.

**Client Communication About Lead**

Federal law requires that owners and occupants of a house or apartment built before 1978 be notified before weatherization takes place. For homes weatherized before December 22, 2008, owners and occupants of a dwelling built 1978 must receive the pamphlet *Protect Your Family from Lead in Your Home* (EPA747-K-94-001). For homes weatherized after December 22, 2008, EPA’s new publication *Renovate Right: Important Lead Hazard Information for Families, Child Care Providers and Schools* (EPA-740-08-002) must be used.
In addition to providing a pamphlet it is required to discuss the plan for lead-safe weatherization practices with owners and occupants. This communication should include:

- Describing how residents’ possessions will be protected from dust
- Identifying the activities residents are expected to perform before the work begins
  - i.e., moving furniture and valuable fixtures.

**DOE DEFERRAL POLICY**

When dealing with homes proven or assumed to have lead, states should develop a lead-based “deferral policy” to provide guidance to their subgrantees as to when it is prudent to defer certain weatherization work in homes that have either tested positive or are assumed to have lead-based painted surfaces. The following steps are recommended:

**First**, the agency should assess the following factors:

1. Is the agency prepared to work with lead-based paint? (i.e., have workers received training in LSW work practices; is the necessary equipment such as HEPA vacuum cleaners available; and does the agency’s liability insurance policy allow work with lead-based paint);
2. What is the condition of the painted surfaces in the house? (i.e., is it so seriously deteriorated that a workman’s presence just walking around the house is enough to stir up lead-based paint laden dust residues and thus pose a threat to the clients and to the workers themselves);
3. What is the extent to which the specific energy efficiency measures determined by the audit will disturb painted surfaces?; and,
4. Will the cost of doing LSW represent a large portion of the total cost, such as to exceed the amount allowed by the state’s health and safety plan? (which could be the case if large amounts of lead based paint surfaces will be disturbed)

**Second**, based on consideration of the above factors, determine whether to:

1. Proceed with all the weatherization work, following LSW work practices, or
2. Do some of the weatherization tasks, defer others, or
3. Defer all of the weatherization work.

Deferral would mean postponing the work either until the Weatherization agency is prepared to work with lead-based paint, or until another agency has corrected the problem.
such that weatherization can be safely performed. In cases where extensive LSW would be necessary, agencies are encouraged to arrange with other organizations, which are funded to do lead paint hazard control, to perform some of the more costly activities, such as entrance testing or clearance testing. In areas where there are no organizations performing such work, weatherization agencies may choose to develop their own capabilities for lead-based paint hazard control work, but they may not use DOE Weatherization funds for this purpose. The state’s lead-based paint deferral policy should not call for deferring the weatherization work solely because there is lead-based paint in the home. Even in such a home, regular weatherization work that does not disturb painted surfaces and does not stir up lead-based paint laden dust residues can be done.

* WPN 02-6 (July 12, 2002) – DOE Grant Guidance, Part 5 “Deferrals”

PART 3
HOUSE PREPARATION
Interior and Exterior LSW Setups

Before LSW Starting Work Remember These DOE Requirements:

1. **ASSUME**: Paint in homes built **before 1978** contains lead (unless a lead-based paint inspection shows it doesn’t) exposing anyone to dust, especially children, is bad.

2. **CHECK**: Federal, state, and local regulations.
   - OSHA has rules for worker safety
   - States and local communities may have rules for waste disposal
   - States may have clearance standards more stringent than federal standards

3. **AVOID**: Creating and spreading dust.
   - Use low dust work practices (i.e., mist surfaces with water before sanding or scraping, use a shroud on power tools)
   - Cover area under work with 6mil poly or two sheets of 4-mil poly.
   - Keep dust contained to the immediate work area. Do not track dust out of the prepared work area
   - The area will need to be thoroughly cleaned after the work is completed. This requires the use of HEPA vacuums followed by washing hard surfaces.

4. **PROTECTION**: Occupants, particularly children.
   - Contractors must take steps to protect occupants from lead-based paint hazards while the work is in progress.
   - Occupants, especially young children, may not enter the work site. Occupants are allowed to return only after the work is done and the home has passed a
visual inspection or in some cases a clearance examination that checks for deteriorated lead-based paint and harmful levels of lead-contaminated dust.

- Occupants’ belongings must be protected from lead contamination. This can be done by removing them from the work area or covering them with protective sheeting and sealing it to prevent dust from getting on the items.
- The work site must be set up to prevent the spread of leaded dust and debris – sealing duct work and using containment plastic are examples.
- Warning signs must be posted at entrances to the worksite when occupants are present; at the main and secondary entrances to the building; and at exterior work sites. The signs must be readable from 20 feet from the edge of the worksite. Signs must be in the occupants’ primary language when practical.
- It may be necessary to temporarily move occupants out of the unit if work will take several days and it involves kitchens, bathrooms, or bedrooms.
- Clean the work site before occupants return. Cleanup is particularly important if painted surfaces were involved.
- If painted surfaces were disturbed, a very careful visual assessment needs to be performed when the work is complete.
- If weatherization work was done on windows and doors lead wipe testing must be conducted.

**Containing Lead Dust to the Work Area**

To contain and control lead dust and debris, lead-safe weatherization requires the establishment of “containment”. For the purposes of LSW “containment” is anything that stops lead-contaminated dust from spreading beyond the work area to non-work areas.

In general, there are many degrees of containment, ranging from simple plastic sheeting on the ground or floor surrounding a small work area to a fully sealed dust room. Some types of containment are more effective than others. A reusable drop cloth is not effective because it can trap and hold dust and paint chips, and can transport lead-contaminated dust from one job site to another; therefore a reusable drop cloth is not a DOE approved LSW containment.

Pre-weatherization containment setup process is essential to keeping lead dust within the work area where it can be easily cleaned. Proper containment of the work area also helps to limit the area you need to clean after the job is complete. This saves time and money.

**INTERIOR LSW SETUP**

DOE requires that Level 1 LSW Containment is required in pre-1978 homes when less than 6 ft² of interior surface will be disturbed and Level 2 Containment when more than 6 ft² of interior surface will be disturbed.

**Restrict Access by Residents in the Work Area**
Restricting interior access to non-weatherization workers from the weatherization work area by placing a “DO NOT ENTER” sign or other physical barrier a minimum of 5 feet from the weatherization work area. Restricting interior access to the work area will avoid unnecessary exposure of residents, especially children, to lead dust and minimize its spread to non-work-areas. Tell the residents to stay away from the area as much as possible. Residents and pets coming and going can easily track lead-contaminated dust throughout the home and into areas that are not being worked on. Therefore, to areas that are unlikely to be cleaned up promptly.

This is especially true for small children under 6 years old. Be sure to explain to residents that this is for their own protection and that small children are most at risk of health problems from exposure to lead. You may need to provide an indication of how long you will be working in a particular area so that residents can plan ahead to obtain items that they may need before you begin working.

**Place a Barrier Across Entrances**
A physical barrier, such as a cone or masking tape, should be placed across doorways to remind residents to stay away, especially in buildings where more than one family lives. The barrier serves as a reminder to residents that they should not enter the work area, and also signals that the area has not yet been cleaned up.

**Do Not Allow Eating, Drinking or Smoking in the Work Area**
This is primarily a protection for workers, but is also important if residents are living in or near the work area. Post signs to indicate that eating, drinking, or smoking in the work area is prohibited. Dust in the air can land on food or be inhaled when smoking. If food is set on an unwashed surface, it can easily pick up lead-contaminated dust, which is swallowed when eating the food.

**Remove or cover furniture and other objects in the room with protective sheeting**
For interior LSW, moving/removing furniture and other objects (area rugs, draperies, pictures, etc.) to at least 5 feet from the weatherization work area. If objects cannot be moved, covering them with a minimum of 2-mil disposable polyethylene (poly) sheeting and securing the sheeting with painters tape.
**Cover Floors.** Use 6-mil plastic or 2 layers of 4-mil poly as a protective sheeting to cover the floor. The sheeting should extend at least five feet to the left, right and front—and in some cases to the back—of the work area. It should be tightly secured to the baseboard or flooring using duct tape, painters’ tape, or masking tape. The corner edge of the protective sheeting should be reinforced using duct tape or a staple.

*If 6-mil plastic is not available, use two layers of 4-mil plastic.* This second layer should be taped to the top of the first layer. This layer will capture any waste and aid in cleaning up.

- When working on small areas of a wall or window the use of a catch bag will assist in keeping dust and debris off the floor and increase efficiency of cleanup.

- Tools that are used frequently should be left within the work area throughout the job to avoid tracking dust to non-covered areas.

- Consider covering shoes/boots with removable booties, wiping off the tops and soles of them with a damp paper towel each time it is necessary to step off the sheeting, or using a **tack pad** that removes dust from the soles of shoes. Immediately place used paper towels in a covered garbage bin and follow instructions under cleanup and disposal. A tack pad can be found at construction suppliers supply catalog. The tack pad can be taped to an outer corner of the
**Close and cover windows and doors**
Close and seal windows in the work area with protective sheeting to prevent dust from getting into trough or on sill (if no work is being done on the window). Doors, including closet and cabinet doors, in the work area need to be closed.

**Close and seal HVAC vents**
- Heating ventilating and air conditioning (HVAC) systems distribute air throughout the building and thus can allow dust to move to other rooms.
- Close and cover the HVAC vents in the work area to prevent air from blowing the dust out of the contained work area and to prevent dust from getting into the HVAC system.
- Turn off the HVAC system for the work area. The vents should then be closed and covered with cardboard and protective plastic sheeting. After the work is complete the vent covers should be removed and washed.

**Poly Containment Walls/Rooms to Limit Dust Spread**
Depending on the type of tools used, the complexity and area of the job and the height of the work area, many interior weatherization activities create dust and debris that will spread beyond five feet from the area that you are working on. To assure dust is contained in the smallest possible area, constructing a poly containment wall or room immediately adjacent to the work area, over a floor area covered with 6-mil polyethylene, will reduce dust dispersion as well as limit the area for final cleanup. Constructing a “poly containment wall” is a simple task of using expansion rods (ZipRods® or inexpensive [less than $10.00] rods) with at least 4-mil polyethylene sheeting. The wall poly and the floor poly should be sealed with duct tape or painters tape to assure dust does not spread outside the containment area. To enhance the contained area further, a two-layer cover door can also be created with poly (see instructions below). Plan your work so that necessary supplies and equipment are in the room to minimize the number of trips outside the room while work is being performed.

*Cover door openings with 2 layers of protective sheeting*
To create a fully contained work area (using the poly contained wall system or in a separate room) requires a passage doorway that will not allow dust to freely flow from the work area into the clean area. Creating a doorway opening using a two-layer poly door will contain the dust within the work area. Using two sheets of 6-mil polyethylene follow the steps below to create the door:

1. Cut the first plastic sheeting layer slightly wider and longer (three inches) than the door frame. NOTE: If a poly containment wall is being used, expansion rods will make up the door frame.

2. Make a small “s” fold at the top of the sheeting and tape it to the top of the door frame or ceiling using painter’s tape. Make a similar “s” fold at the bottom of the sheeting and tape it to the flooring.

3. For exiting and entering the room, cut a long vertical slit in the middle of the protective sheeting leaving six inches at the top and bottom uncut. Reinforce the top and bottom of the slit with duct tape to prevent the plastic from tearing.

4. Using duct tape, tape a second layer of 6-mil poly sheeting to the top of the doorframe. This layer is cut slightly shorter than the doorframe so that it will hang down flat against the first sheet of plastic.

5. Securely tape the top corners of the second layer to the doorframe and first layer. Leave it hanging over the first layer.

**EXTERIOR LSW SETUP**

DOE requires that Level I LSW Containment is required in pre-1978 homes when less than 20 ft² of exterior surface will be disturbed and Level 2 Containment when more than 20 ft² of exterior surface will be disturbed. Providing special containment for exterior weatherization measures may seem excessive; however, if lead chips and
dust are allowed to remain on the soil and lawn around the house it can pose a long-term health for occupants. Remember, children playing with toys and pets in the grass and soil will be exposed to lead if it is present. Lead on their hands will go into their mouths and may be swallowed. Lead also is transferred onto clothing and from pets, and taken inside the home where it is unknowingly transferred to household furnishings, carpets and other occupants.

Following are requirements for preparing exterior lead-safe weatherization work areas:

- restricting exterior access to non-weatherization workers from the weatherization work area by placing a “DO NOT ENTER” sign or other physical barriers (orange cones, saw horses, or caution tape) a minimum of 20 feet from the weatherization work area.

- All windows and doors within 20 feet of the work area should be closed to prevent dust from entering the home. Consider requesting that the neighbors also close their windows and doors. Windows within 5 feet of active weatherization (such as lifting siding or drilling holes for blowing insulation should be covered with 4-mil poly sheeting.

- Remove toys and other items from the work area and cover all play areas.

- Confining dust and debris in an area as small as possible by containing the area with disposable 6-mil poly sheeting under all work areas. For exterior LSW, if space permits, disposable 6-mil poly sheeting below the work area must be placed 10 feet (for every house level were work is being done - for example 10 feet for one story house, 20 feet for two story house) in each direction of the weatherization work area. Since exterior poly can be a slip hazard, approved exterior LSW poly containment troughs may be used as a
substitute for poly laid on the ground. For small LSW work areas, such as a window, and catch bag/containment trough may also be used.

Note: Black plastic can harm plants. An option for covering grass shrubs, and gardens is a disposable mesh material such as landscape fabric. Landscape fabric is an inexpensive plastic mesh that is often used by landscapers. It can be found in many plant nurseries or hardware stores. This covering will protect the soil and plants from lead contamination.

- Staple or tape the protective sheeting to the wall of the building, or use lath strips or 2X2s to hold the material next to the wall. Use heavy objects (e.g., rock) to weight other edges of the protective sheeting to the ground so that it won’t blow in the wind.

- When using ladders on plastic sheeting, place a sturdy piece of plywood (with ladder blocks) on the plastic and then set the ladder on the plywood. Spiking the plywood into the ground will secure the plywood and create a solid base for the ladder. Commercial anti-slip ladder base-supports are also available.

- To avoid lead dust drifting into window and door opening, cover and seal these opening with 4-mil poly and tape.
For homes on sloped lots and when conducting LSW on rainy and snowy days, working off plastic can be hazardous. For these situations, as well as on windy days, to provide adequate containment to catch the lead particles and other debris, the innovation of a Montana weatherization agency created a catchment troughing system. The system is made up of PVC and metal framing and can be adjusted for various height of work. Using 6-mil poly, the system creates a deep pocket to contain debris, but is close enough to the work surface to avoid working off plastic.
PART 4
LEAD-SAFE WEATHERIZATION MEASURES

Any activity that disturbs painted surfaces on residential structures built before 1978 may cause lead hazards. Certain steps should be taken whenever surfaces with lead-based paint or presumed lead-based paint are disturbed. These steps are known as “lead-safe weatherization” (LSW) work practices. Designed to protect clients and workers, the U.S. Department of Energy requires that Level I LSW Containment is required in pre-1978 homes when less than 6 ft² of interior painted surface per room or 20 ft² of exterior painted surface will be disturbed and Level 2 Containment when more than 6 ft² of interior painted interior surface or 20 ft² feet of exterior painted surface will be disturbed.

The following weatherization measures are likely activities to apply LSW; however the level of containment for each application is dependent on the size of project, the tools that will be used and the amount of dust that will be generated. It is important that every weatherization measure be individually assessed for the level of containment. Remember, no matter how small the job is, if you create dust you MUST clean it up. If in doubt, apply the highest level of containment.

- Drilling holes in interior walls
- Drilling holes in exterior walls
- Cutting attic access into ceiling
- Removing caulk or window putty (interior)
- Removing caulk or window putty (exterior)
- Removing weather stripping
- Door modifications
- Planing a door in place
- Installing door shoes
Replacing door jambs & thresholds
Replacing windows
Furnace filter replacement
Furnace and thermostat replacements
Replacing HEPA filters and cleaning HEPA vacuums

The following sections contain instructions on how to set-up work areas for individual job tasks. It also includes required personal protective equipment, such as respirators, overalls, head coverings and foot coverings.

**Set Up For Drilling Holes in Interior Walls**

Drilling holes into walls can generate high levels of leaded dust and debris. If the hole is to be drilled through painted surfaces in buildings constructed prior to 1978, the following set-up and clean-up are required:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.
- Restrict access; place “DO NOT ENTER” or similar caution tape across doorway or post signs.
- Turn off the HVAC system or close and seal all vents in the work area with poly sheeting.
- Close and seal all doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.
- Protect furnishings: remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.
- Protect the floor: tape 6-mil protective sheeting to the baseboard under work area using masking tape (or durable tapes where masking tape
doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the floor should extend about 5 feet out from the wall from and on each side of the hole to be drilled. Of course there will be instances where the floor below the hole to be drilled will be smaller than 5 feet by 10 feet, in those cases cover the entire area. In smaller areas it may be necessary to tape the sides up to the baseboard to insure no dust from the drilling is getting down between the poly and the wall.

- Stock the work area; put all necessary tools and supplies on the 6-mil protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or a staple.

- Keep clothes clean; use disposable overalls with hoods. If the overalls do not have hoods, separate disposable head coverings will be used to keep lead dust from the head and hair. Use disposable foot coverings. When stepping off the poly floor covering for any reason, the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas. If foot coverings were not worn, shoes must be wiped off.

- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- When drilling, the worker has the choice of drilling with HEPA attached tool shroud or working wet.

- When working wet, have one person wet mist the drill bit while the other person drills the hole. Make sure that the drill is plugged into a GFCI or a battery-powered drill is used and that water is not sprayed onto the drill motor.

  *Option: Apply shaving cream to the location to be drilled. Shaving cream will usually adhere to the wall and traps dust particles generated from the substrate below. If drilling large holes or the substrate is quite thick you may need to stop and re-apply more shaving cream to prevent the release of any dust.*

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.
HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

**Set Up For Drilling Holes or Lifting Siding on Exterior Walls**

Drilling holes into walls or lifting siding can generate high levels of leaded dust and debris. If the hole is to be drilled through painted surfaces on the exterior of buildings constructed prior to 1978, the following practices for set-up, removal and clean-up are required:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Restrict access; place “DO NOT ENTER” or similar caution tape at least 20 feet out from work area.

- Cover the ground below the work area with 6-mil poly sheeting. Tape or staple the sheeting to the wall or foundation under the work area. If tape is used be certain that the tape not peel paint from the surface adhered to. The protective sheeting on the ground should extend 10 feet out from the wall and on each side of the work area. Build a curb around the work area perimeter to lay the edge of the poly over to help prevent paint chips and dust from blowing off the ground cover.

Options:

I. Effective containment of lead dust and debris with exterior measures can be challenging in windy and snow locations and sites with steep grades. In these cases bringing the containment as close to the work area is desirable. To attain this, one innovative Montana weatherization crew devised an adjustable exterior containment trough system made up of PVC piping, 6-mil poly and clamps. The finished trough system can be elevated to accommodate multi-story homes and effectively collect work debris on homes on sloped grades.

II. For small work areas or working on a window - in addition to the poly sheeting on the ground, make a catch bag frame using one-inch PVC pipes and taping a 6-mil trash bag to the frame. During the weatherization work the framed bag can be held or attached to the wall under the work area to collect the debris.
- Close and seal all doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Lay bricks, wood scraps, etc., on the corners to prevent the poly from moving.

- Keep clothes clean; use disposable overalls. Also use disposable foot coverings. If you need to step off the poly covering for any reason, the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas. If foot coverings were not worn, shoes must be wiped off.

- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- If lifting siding, first score the painted joints pry and pull components apart. Pulling nails instead of pounding creates less dust and fewer paint chips.

- When drilling holes, the worker has the choice between using HEPA attached tool shrouds or working wet.

- If working wet, have one person wet mist the drill bit while the other person drills the hole. Make sure that the drill is plugged into a GFCI or a battery-powered drill is used and that water is not sprayed onto the drill motor. Option: Apply shaving cream to the location to be drilled. Shaving cream will usually adhere to the wall and traps dust particles generated from the substrate below. If drilling large holes or the substrate is quite thick you may need to stop and re-apply more shaving cream to prevent the release of any dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

- Place debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.
Cutting Attic Access into Ceiling

Precaution: Beware that the attic could be insulated with vermiculite insulation and could contain asbestos. If vermiculite is present the insulation the work may need to be deferred to conduct bulk testing to determine if the insulation contains greater than 1 percent or greater asbestos.

Cutting attic access holes generates dust and debris. Accessing the attic from the exterior should be a consideration. If the hole is to be cut through painted surfaces in buildings constructed prior to 1978 the following set-up and clean-up procedures are required:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
- If possible, cut the access from a hallway or closet.
- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.
- Restrict access: place “DO NOT ENTER” tape across doorway or post signs.
- Turn off the HVAC system or close and seal all vents in the work area.
- Close and seal all doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.
- If cutting the access from a hallway or closet, consider hanging the 6-mil poly sheeting from tension rods to create a tight containment area.
- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of the work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.
- Protect the floor: tape 6-mil protective sheeting to the baseboard under work area using masking tape (or durable tapes where masking tape doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the floor should extend about 5 feet out from the wall and on each side of the hole to be cut. Often times the attic access will be cut into the ceiling inside closets. Where the floor below the hole to be cut is smaller than 10 feet by 10
feet, it may be necessary to tape the sides up to the baseboard to insure no dust from the cutting is deposited between the poly and the wall.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or a staple.

- Keep clothes clean; use disposable overalls with hoods. If the overalls do not have hoods, separate disposable head coverings should be used to keep lead dust from the head and hair. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason, the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters and eye protection.

- Use a utility knife (if cutting sheetrock) or hand saw to cut the opening. Have one person wet mist the cut while the other person cuts the hole. A HEPA attached shrouded reciprocating saw can also be used.

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non-work areas and the weatherization vehicle.

- Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

Removing Caulk Or Window Putty – Interior

If caulk has not been painted and is not applied to painted surfaces, then lead-safe work practices do not apply.

Although the removal of painted caulk or putty is not likely to create significant levels of leaded dust, precautions still need to be taken to protect the worker and building
occupants. If the caulk or putty is painted or is applied to painted surfaces in buildings constructed prior to 1978, the following set-up, removal and clean-up are required:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.
- Restrict access; place “DO NOT ENTER” tape across doorway or post signs.
- Turn off the HVAC system or close and seal all vents in the work area.
- Close and seal all doors and other windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.
- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.
- Protect the floor with 6 mil poly sheeting, taping it to the baseboard under the work area using masking tape (or durable tapes where masking tape doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the floor should extend about 5 feet out from the wall and from each edge of the hole to be drilled. If removing window putty; lay out 6-mil poly sheeting on the floor and ground on either side of the window to be worked on so that there is at least 5 feet of poly spread out around the window on both sides. Tape it securely to the floor on the inside, and weigh it down outside to keep it from being blown by the wind.

**Option:** For working on a window - in addition to the poly sheeting on the ground, make a catch bag frame using one-inch PVC pipes and taping a 6-mil trash bag to the frame. During the weatherization work the framed bag can be held or attached to the wall under the work area to collect the debris.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or a staple.
- Keep clothes clean, use disposable overalls. Head coverings may not be necessary with caulk removal. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective
Clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- Mist the caulk or putty to be removed, with water, while scraping the caulk to remove it.

- If removing window putty, HEPA vacuum window channels before replacing the glass and/or glazing compound.

- Do not heat the old glazing compound with an open-flame torch to soften it. A low-temperature heat gun (less than 1100 °F) can be used if the glazing compound is hardened. If a heat gun is available but you are not certain that it maintains a temperature of less than 1100 °F - DO NOT use it.

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work areas and taking them through clean, non work areas and the weatherization vehicle.

- Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

Removing Caulk or Window Putty – Exterior

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Restrict access; place “DO NOT ENTER” tape at least 20 feet from work area.

- Remove all outdoor furniture and toys from work area.

- Cover the ground with 6-mil poly sheeting below the work area. Tape protective sheeting to the wall or foundation under work area using durable tape or stapes. Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the ground should
extend 10 feet out from the wall and on each side of the work area. Build a curb around the work area perimeter to lay the edge of the poly over to help prevent paint chips and dust from blowing off the ground cover.

*Option:* For working on a window - in addition to the poly sheeting on the ground, make a catch bag frame using one-inch PVC pipes and taping a 6-mil trash bag to the frame. During the weatherization work the framed bag can be held or attached to the wall under the work area to collect the debris.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Secure the corners with scrap wood, brick or rocks.

- Keep clothes clean, use disposable overalls. Head coverings may not be necessary with caulk removal. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination, workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- Mist the caulk or putty to be removed, with water, while scraping the caulk to remove it.

- If removing window putty, HEPA vacuum window channels before replacing the glass and/or glazing compound.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

- Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

*Weatherstripping*

Installing and/or removing unpainted weatherstripping or weatherstripping that is attached to a unpainted surface does not require a LSW containment setup. However, make sure that the areas around the door or windows are HEPA vacuumed thoroughly and wet-cleaned when the job is finished.

If the weatherstripping to be removed is on a building constructed prior to 1978 and has been painted over, the following set-up removal and cleanup is required:
- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.

- Restrict access; place “DO NOT ENTER” tape across doorway or post sign.

- Turn off the HVAC system or close and seal all vents in the work area.

- Close and seal all other doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.

- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.

- Protect the floor, with 6-mil poly sheeting and tape to the baseboard under work area using masking tape (or durable tapes where masking tape doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. Extend the poly through the doorway. The protective sheeting on the floor should extend about 5 feet out from the doorway and from each side of the doorway.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or a staple.

- Keep clothes clean, use disposable overalls. Head coverings are not necessary with weatherstripping removal. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumeed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

- When work creates dust or paint chips, and OHSA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- Mist the painted weatherstripping to be removed, with water, while scraping or pull the weatherstripping to remove it.
• Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

• HEPA vacuum and damp-wipe all tools before removing them from the work areas and taking them through clean, non work areas and the weatherization vehicle.

• Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

**Exterior Door Modification**

Modification of an unpainted door with unpainted hinges, frame and stops does not require a LSW containment setup; however, make sure that the areas around the door are HEPA vacuumed thoroughly and wet-cleaned when the job is finished.

A tight-fitting door is required for weatherstripping to work properly; however, if the door fits too tightly, the resulting friction can cause the paint to rub off and potentially create leaded dust hazards.

Check the door to see if there are any friction or impact areas on the door and jamb. Friction and impact areas will rub leaded paint off and turn it into fine dust. Make sure that there is the proper gap between the door and the jamb all around the door. Check for loose hinges and tighten and reset if needed. If it is still rubbing, remove the door and take it outside to the lead-safe work area. Remove the door and set-up the lead-safe work area as follows:

• Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

• Restrict access; place “DO NOT ENTER” tape at least 20 feet from work area.

• Cover the ground below the work area. The protective sheeting on the ground should be a minimum of 10 foot by 10-foot sheet of 6-mil poly. Build a curb around the work area perimeter to lay the edge of the poly over to help prevent paint chips and dust from blowing off the ground cover. Weigh the edges of the poly down to prevent it from blowing away. Place sawhorses on poly, to place door on.

• Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting.

• Use a utility knife to score the paint around the edge of the hinge. Remove the hinge screws and remove the door.
- HEPA vacuum the threshold and floor below the door opening to remove any paint chips or dust created when removing the door.

- Place door on saw horses in work area.

- Keep clothes clean, use disposable overalls. Head coverings are not necessary if using a hand planer. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to unprotected areas.

- When work creates dust or paint chips, and OSHA exposure assessments have not been completed for the job task(s) or there has been a positive initial determination; workers should wear at least a NIOSH-approved respirator for lead work that provide a minimum protection factor of ten times the permissible exposure limit.

- Plane the door edge where it rubs.

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

- Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

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**Planing a Door In Place**

If the door can't be removed, it can be planed in place. Set up the work area as follows:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.

- Restrict access; place “DO NOT ENTER” tape across doorway or post sign.

- Turn off the HVAC system or close and seal all vents in the work area.
Close and seal all other doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.

Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.

Protect the floor with 6-mil poly sheeting and tape protective sheeting to the baseboard under work area using masking tape (or durable tapes where masking tape doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the floor should extend about 5 feet out from the wall and on each side of the door opening.

Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or a staple.

Keep clothes clean, use disposable overalls. Head coverings are not necessary if using a hand planer. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

Door Shoe Installation
Cutting door bottoms to install door shoes can produce high levels of leaded dust, especially when using a power saw without a HEPA attached shroud. It is recommended to take the door outside and cut the door in a lead-safe work area. Remove the door and set-up the lead-safe work area as follows:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
Restrict access; place “DO NOT ENTER” tape at least 20 feet from work area.

Cover the ground below the work area with 6-mil poly sheeting. The protective sheeting on the ground should be a minimum of 10 foot by 10-foot with at least 5 feet of poly over the work area. Build a curb around the work area perimeter to lay the edge of the poly over to help prevent paint chips and dust from blowing off the ground cover. Weigh the edges of the poly down to prevent it from blowing away. Place sawhorses on poly, to place door on.

Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting.

Use a utility knife to score the paint around the edge of the hinge. Remove the hinge screws and remove the door.

HEPA vacuum the threshold and floor below the door opening to remove any paint chips or dust created when removing the door.

Place door on saw horses in work area. Consider using a hand planner or hand saw; they generate less dust than a power saw. Note: Running a piece of masking tape on the outline will not reduce the amount of leaded dust created and should not be relied upon as a way to eliminate dust.

Keep clothes clean, use disposable overalls. Head coverings are not necessary if using a hand planer. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to unprotected areas.

When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters and eye protection.

Plane the door edge where it rubs.

Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.
Door Jambs & Thresholds
Replacing jambs and thresholds may generate moderate to high levels of leaded dust.
LSW set-up the work area as follows:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.
- Restrict access, place “DO NOT ENTER” tape at least 5 feet out from door way on both sides.
- Turn off the HVAC system or close and seal all vents in the work area.
- Close and seal all other doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.
- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.
- Protect the floor with 6-mil poly sheeting and tape protective sheeting to the baseboard under work area using masking tape (or durable tapes where masking tape doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the floor should extend about 5 feet out from the wall from and on each side of the door opening.
- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape and a staple.
- Keep clothes clean, use disposable overalls. Head coverings are not necessary if using a hand planer. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.
- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.
- Cut the paint bead between the trim and wall with a utility knife. Pry off the trim and remove jambs carefully so as not to disturb the paint. Lightly mist it with water while removing it. Unless the trim is of a size or design that is not
replaceable, it is not recommended that it be reused since any sanding of it after replacement will require further set-up to contain the dust.

- If the trim breaks during removal, in sizes that will fit into a disposal bag, place the trim pieces and debris in 6-mil poly disposal bags. If the trim comes off in full-length wrap and tape the pieces in 6-mil poly for disposal or cut the trim into short pieces to fit inside six-mil poly disposal bags.

- If the installation of the new door and trim will not disturb any more paint proceed with the cleanup described below. If the installation may disturb additional paint install the new door and trim and then proceed with the cleanup described below.

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non-work area and the weatherization vehicle.

- Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

**Replacing Windows**

Replacing windows may generate moderate to high levels of leaded dust and debris. (Windows and associated trim were typically painted with leaded paint inside and out).

Set up the work area as follows:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.

- Restrict access, place “DO NOT ENTER” tape across doorway or post sign.

- Turn off the HVAC system or close and seal all vents in the work area.

- Close and seal all doors and other windows in the work area. Use 4-mil protective sheeting on windows that will not be removed.

- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.

- Protect the floor, tape protective sheeting to the baseboard under work area using masking tape (or durable tape where masking tape doesn’t
work). Be certain that the tape used will not peel paint from the surface adhered to. Lay out 6-mil poly sheeting on the floor and ground on either side of the window to be worked on so that there is at least 5 feet of poly spread out around the window on both sides. The protective sheeting on the floor should extend about 5 feet out from the wall and from each side of the window opening. Whether working from the inside or out, it is important to keep both sides of the window unit as free from dust and chips as possible. Tape it securely to the floor on the inside, and weigh it down outside to keep it from being blown by the wind.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or staple. For exterior plastic secure the poly with scrap wood, bricks or stones.

- Keep clothes clean, use disposable overalls. Head coverings are not necessary if using a hand planer and most hand tools. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- Cut the paint bead between the trim and wall with a utility knife. Pry off the trim and remove windows carefully so as not to disturb the paint. Lightly mist the trim with water while you are removing it. Unless the trim is of a size or design that is not replaceable it is not recommended that it be reused since any sanding of it after replacement will require further set-up to contain the dust.

- If the trim breaks during removal, in sizes that will fit into a disposal bag, place the trim pieces and debris in 6-mil poly disposal bags. If the trim comes off in full-length pieces then roll the trim in a piece of six-mil poly and tape the edges closed for disposal.

- HEPA vacuum the window frame before installing a new window.

- If the installation of the new window and trim will not disturb any more paint, proceed with the cleanup described below. If the installation may disturb additional paint, install the new window and trim and then proceed with the cleanup described below.

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.
Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

**Furnace Filter Replacement**

The simple act of replacing a furnace filter can disperse lead dust. If lead-safe weatherization activities that could have generated lead dust have occurred in the home since the filter was last changed, it is possible that some of the dust was trapped in the furnace filter if the furnace had been running. As a precaution before leaving the weatherized house the filter should be changed taking these simple steps:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.
- Restrict access: place “DO NOT ENTER” tape across doorway or post signs.
- Turn off the HVAC system.
- Protect the floor, under work area using 6-mil poly sheeting. Lay out the sheeting on the floor so that there is at least 5 feet of poly spread out on both sides of the furnace filter opening.
- When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.
- Mist the filter(s) on each side as it is slowly slid out of the furnace cabinet to minimize release of trapped dust.
- Place filter(s) in a 6 mil poly disposal bag.
- HEPA vacuum the surfaces accessible from the filter opening and the area around the furnace. Start at the highest point and work downward.
- Install new filter(s) and close or replace filter access cover.
- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.
Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

**Replacing Thermostats**

Although replacing thermostats may generate a small amount of dust and debris; if the area to be disturbed or cut is through a painted surface in a building constructed prior to 1978 the following set-up and clean-up procedures are required:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Ask occupants to leave the room where work will be done. Have them stay out until final cleanup.

- Restrict access: place “DO NOT ENTER” tape across doorway or post signs.

- Turn off the HVAC system.

- Protect the floor, under work area using 6-mil poly sheeting. Lay out the sheeting on the floor so that there is at least 5 feet of poly spread out on both sides of the furnace filter opening. Tape the sheeting to the baseboard to assure dust can not get under the sheeting.

- Close and seal all doors and windows in the work area. Use 4-mil protective sheeting on windows and doors within 5 feet of the work area.

- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.

- Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape or a staple.

- Keep clothes clean; use disposable overalls. For thermostat repair or replacement overalls with a hood is likely not necessary. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason, the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.
When work creates dust or paint chips, and OSHA exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

- Use a utility knife or hand saw to cut the opening. Have one person wet mist the cut while the other person cuts the hole or use HEPA attached equipment.

- Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

- Place all debris, including disposable overalls, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.

**Furnace Replacement**

If the furnace is to be replaced and the ductwork is to remain in place it should be noted that the process of disconnecting the old furnace from the duct work and reconnecting the new furnace may disturb lead paint surfaces or loosen lead dust settled in the ducts. Since there can be an appreciable amount of surface area inside the duct work, considerable amounts of lead dust may have accumulated since the furnace was installed. Lead dust may not only get deposited from the air circulating through the ducts, but it may also accumulate below vent openings in the form of paint chips.

If the building was constructed prior to 1978 the following set-up and cleanup procedures are recommended for removal and installation of a new furnace:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- Ask occupants to leave the room where work will be done. Have them stay out until after final cleanup.

- Restrict access, place “DO NOT ENTER” tape across doorway or post sign.

- Protect furnishings; remove drapes, curtains, furniture, and rugs within 5 feet of work area. If items cannot be moved beyond 5 feet, cover them with a 4-mil poly sheeting. Remember: it is always in the occupants’ best interest to move the furniture out of the work area.
Protect the floor with 6-mil poly. Furnaces are often located in very small closets and therefore getting poly on the floor around the furnace is not always possible. However, if there is any open floor space around the furnace or outside the furnace closet below possible areas where ductwork will be detached, place protective sheeting below the work areas. If possible, tape the poly to the baseboard in the work area using masking tape (or durable tape where masking tape doesn’t work). Be certain that the tape used will not peel paint from the surface adhered to. The protective sheeting on the floor should extend at least 5 feet out from the furnace and/or areas where ductwork will be detached.

Stock the work area; put all necessary tools and supplies on protective sheeting before beginning work to avoid stepping off the protective sheeting. Reinforce corners with duct tape and a staple.

Keep clothes clean, use disposable overalls. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.

When work creates dust or paint chips, and exposure assessments have not been performed for the job task(s) or there has been a positive initial determination workers should wear at least a NIOSH-approved half face respirator with HEPA filters.

Be sure that gas lines are shut-off and electrical power is shut-off, prior to starting any disassembly work.

Detach the ductwork as carefully as possible. Use HEPA vacuum to clean-up dust that falls from the ducts or furnace, as soon as possible, to prevent tracking or spreading the dust as work continues.

Once the old furnace is detached from the ductwork, use 6-mil poly and durable tape to seal ALL the openings on the furnace PRIOR to moving the furnace out of the area.

HEPA vacuum the accessible portions of the duct work to minimize the disturbance of dust while installing the new furnace.

Frequently HEPA vacuum and wet-wipe surfaces to help minimize the spread of dust.

HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

Place all debris, including disposable clothing, in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.
Replacing HEPA Filters and Cleaning HEPA Vacuums

At the Weatherization Facility

HEPA filters and vacuums will hold the highest concentration of lead dust; therefore, special care when replacing filters or cleaning vacuums needs to be taken to prevent the dispersal of lead dust. If possible change filters at weatherization shop facilities. To change the filter at the weatherization shop facility the following set-up and clean-up is required:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.
- Restrict access; place “DO NOT ENTER” tape across doorway or post signs.
- Move equipment or other items within 5 feet of area where vacuum is placed for filter change. If items cannot be moved beyond 5 feet, cover them with 4-mil poly sheeting.
- Protect the floor with 6-mil sheeting and tape protective sheeting to the floor using durable tape. The protective sheeting on the floor should extend about 5 feet out from vacuum on each side.
- Keep clothes clean; use disposable overalls with hoods. If the overalls do not have hoods, separate disposable head coverings should be used to keep lead dust from the head and hair. Also use disposable foot coverings. If it is necessary to step off the poly floor covering for any reason, the protective clothing should be thoroughly vacuumed with a HEPA vacuum and removed before stepping off to prevent the tracking of lead to the unprotected areas.
- When replacing a HEPA filter or cleaning a HEPA vacuum, workers should wear at least a NIOSH-approved half face respirator with HEPA filters.
- Follow the manufacturer’s instructions for filter replacement and cleaning.
- As the filter is slowly removed from the vacuum, mist the surface of the filter to minimize dust release as the filter is released.
- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.
- Place the dirty filter and vacuum debris in 6-mil disposal bags. Seal the disposal bag using a gooseneck and label bag.

Replacement of HEPA Filter and Cleaning HEPA Vacuum at Work Site
HEPA filters and vacuums will hold the highest concentration of lead dust so special care when replacing filters or cleaning vacuums needs to be taken to prevent the dispersal of lead dust. If the HEPA filter in a vacuum must be changed at a job site the filter replacement must be completed outdoors. However, do not attempt to conduct the procedure during windy periods. To change the filter at the work site follow the same set-up as described above for “vacuums at weatherization facilities” with the following modifications:

- Photo document LSW process and equipment used to verify proper setup and application of lead-safe work practices. Photos should be retained in client file.

- On a calm day move the vacuum outdoors away from the house and away from walkways and pathways. If the outside of the house has already been setup as a LSW work area, use this area for replacing the filter. If it is a windy day and the filter must be changed, it is recommended that it be replaced at a weatherization facility.

- Restrict access; place “DO NOT ENTER” tape at least 20 feet from work area.

- Cover the ground below the work area. The protective sheeting on the ground should be a minimum of 10 foot by 10-foot sheet of 6-mil poly. Set it up over a 10 foot by 10 foot sheet of 6-mil poly sheeting so that at least 5 feet of poly is all the way around the end to be cut. Build a curb around the work area perimeter to lay the edge of the poly over to help prevent dust from blowing off the ground cover. Weigh the edges of the poly down to prevent it from blowing away. Place vacuum on poly and follow the manufacturer’s direction for filter replacement.

- HEPA vacuum and damp-wipe all tools before removing them from the work area and taking them through clean, non work area and the weatherization vehicle.

- Place dirty filter and debris in heavy-duty disposal bags. Seal the disposal bag using a gooseneck and label bag. Do not leave any debris on site.
PART 5
LSW CLEANUP, VERIFICATION AND DEBRIS DISPOSAL

A critical element of lead-safe weatherization is the continuous process of job-site cleanup. Lead-safe weatherization clean-up involves these five elements:

**Clean-up Element 1. Use Containment.**
Effective cleaning begins with proper preparation and containment. Whether the weatherization job requires Level 1 or Level 2 Containment, clean-up will be much easier and efficient if proper containment has kept all dust and debris confined to the work area.

**Clean-up Element 2. Clean As You Work.**
Cleaning the work site frequently as the job progresses will reduce the spread of dust and paint chips. The cleaning need not be as thorough as the final cleanup. It should, however, keep debris, dust, and paint chips from piling up and spreading beyond the immediate work site. Cleanup during the job includes:

- **Removing debris frequently.** During weatherization jobs, cleanup and bag debris as it is created.
- **Vacuuming horizontal surfaces frequently.** HEPA vacuum dust and paint chips that settle on surfaces, including protective sheeting. As workers come and go during the workday, this debris is easily spread. Periodic cleaning throughout the workday will help to minimize workers tracking dust. Do not use non-HEPA filtered vacuums or dry sweeping for cleanup.
- **Collect paint chips as they are created.** When removing paint, paint chips can also spread outside the immediate work areas as workers come and go from the work site. To keep paint chips from spreading beyond the work site, make sure that they are collected as they are created. Also, periodically HEPA vacuum or wet sweep and bag paint chips.
- **Wrapping and disposing of removed components.** When removing painted components such as windows, trim, and cabinets, wrap and tape them in 6-mil plastic sheeting and dispose of them in stages. This will prevent the spread of debris and keep residents, especially children, from coming into contact with leaded dust created by work.

To keep work area as clean as possible during weatherization and keep from spreading lead dust to other parts of the home precautions should be taken when leaving the work site. Every time workers leave the work area, shoes should be wiped or vacuumed before stepping off the plastic sheeting. A large tack pad on the floor can help to clean the soles of shoes. Remove booties if they are being used.
Clean-up Element 3. Use Proper Cleaning Techniques and Sequence.
You should be careful not to spread dust and contaminate other areas while cleaning. **HEPA vacuum cleaning followed by wet cleaning** of surfaces of the work areas includes vertical surfaces such as walls and windows and horizontal surfaces such as floors, door tops, window troughs, and windowsills. **HEPA vacuum** will collect dust and debris not visible to the naked eye. **Wet cleaning** the area will further dislodge any lead contaminated dust or debris not collected by the first HEPA vacuum. Wet cleaning also gets dust and debris that is stuck to surfaces.

Cleaning should proceed from high to low (i.e., from top of wall to window to floor). Cleaning also includes personal cleaning of personal protective clothing, work tools and equipment used during the LSW process.

Clean-up Element 4. Visual Inspection Verification. Checking the quality of worksite cleanliness is a two phase process:
Phase 1. Worker visual inspection during the work. Look for any visible paint chips, dust or debris and clean as you work.
Phase 2. Supervisor visual inspection after cleanup. There should no evidence of settled dust following a cleanup effort. If dust is observed, the weatherization crew must be required to repeat the cleaning BEFORE post-weatherization dust samples are collected. If work is done outside the house, the grounds around the dwelling and all exterior horizontal surfaces should also be examined visually to make certain that all waste and debris have been removed and that leaded dust or paint chips were not left behind.

Clean-up Element 5. Safe and secure disposal. Bag and gooseneck seal all waste including disposable personal protection clothing in 6-mil plastic bags or two doubled-up heavy duty bags. Safely dispose of all waste in accordance with state and federal regulations.

Disposal - Local and Federal Information
EPA considers LSW, renovation and remodeling as routine residential maintenance and allows waste to be taken to a solid waste landfill. In a memorandum to RCRA Senior Policy Advisors and EPA Regions 1-10, dated July 31, 2000, EPA=s Office of Solid Waste stated that lead-based paint waste from households may be disposed of as household garbage subject to applicable state regulations. Some states may continue to regulate lead-based paint waste as potentially hazardous if generated in large enough quantities. (U.S. EPA Regulatory Status of Work Generated by Contractors and Residents from Lead-based Paint Activities Conducted in Households Memorandum from Elizabeth A. Cotsworth, Director, Office of Solid Waste, to RCRA Senior Policy Advisors and EPA.)

Disposal NOTE:
Some states have enacted more stringent waste management and disposal regulations. Weatherization crews must be aware of state and local regulations concerning hazardous and solid waste management and disposal.

Post LSW Recommendations.
To assure unknown leaded paint dust is not getting into work and personal vehicles, taken back to the office or brought home; before leaving the worksite workers should thoroughly wash hands and face using baby wipes. As soon as arriving home, workers should take a shower and be sure to thoroughly wash the hair, especially before playing with children. Wash work clothes separately from regular household laundry to stop lead particles from getting on other clothes.

LSW Clean-Up Supply List

- HEPA Vacuum
- Misting bottle and pump sprayer
- Mop with disposable heads
- Household Detergent
- Two buckets or two-sided bucket (one for wash water and the other for rinse water)
- Disposable wash towels
- Baby-wipes
- 6-mil garbage bags or heavy-duty plastic garbage bags
- Duct tape
- Shovel and rake

Above is a list of cleaning tools that you should always keep in your weatherization work vehicle. The tools listed are for cleaning interior and exterior jobs. Some tools, such as the pump sprayer, shovel, and rake are used primarily for exterior clean-up. Other tools, such as the buckets (you need either a two-sided bucket or two single buckets to keep your wash and rinse water separate) and mops are used primarily for interior clean-up. Be sure to change mop heads when necessary. A dirty, used mop head could spread lead dust into other areas.
INTERIOR CLEANUP – 10 STEPS

Interior lead-safe cleaning requires the use of a HEPA vacuum and wet cleaning methods. Cleaning an area with a broom and dustpan is not permitted since this practice will spread the leaded dust around, making the cleanup more difficult and time consuming. Standard “shopvacs” (even those with HEPA filters) and regular vacuums cannot control fine dust particles and MUST NOT be used for LSW and clean-up.

The following lead-safe cleaning sequence should be used after the interior weatherization task(s) have been completed:

**Step 1.** Pick-up all visible paint chips and debris and discard in 6-mil (or double heavy duty) plastic bags.

**Step 2.** HEPA vacuum the contained work area surfaces from high to low. Start with the walls (house walls as well as poly walls), tops of doors, and window troughs (high) and work your way down to the floor. Vacuum the protective floor sheeting last.

**Step 3.** Wet clean the surfaces using a household detergent. When cleaning wet, you can either mist the surface with cleaning solution or use a wet disposable cloth. Work from high surfaces to low. If a surface is very dirty use a moist paper towel before beginning to scrub with a wet cloth. Replace cloths and change rinse water often.
Step 4. While working on the floor containment poly sheeting, HEPA vacuum and damp wipe (using disposable “baby wipes”) all tools, equipment and cords, including the HEPA vacuum and hose. Dispose all wipes in a 6 mil plastic bag (or two heavy duty bags). Once cleaned, all tools, except the HEPA vacuum can be transferred from the containment area.

Step 5. While standing on the floor containment poly sheeting, HEPA vacuum and damp wipe personal protective clothing.

Step 6. Starting with wall and furniture poly containment, carefully remove the plastic from the furniture and wall surfaces and lay it on the floor containment poly sheeting. While working on the floor containment, tightly fold the plastic together, with the lead exposed side folded to the inside. Once folded, tightly roll the plastic and place it in a large 6-mil plastic bag (or two heavy duty bags).
Step 7. While working on the floor containment poly sheeting, one last time HEPA vacuum the floor plastic and your personal protective clothing, then tightly fold the floor plastic together, with the lead exposed side folded to the inside. Once folded, tightly roll the plastic and place it in a large 6-mil plastic bag (or two heavy duty bags). If the floor surface under the poly is washable (carpet is not), spray/mist the detergent solution on the surface and wipe it clean. As the wipe gets dirty, fold it with the dirty side on the inside. This will keep a clean wipe surface available. If using a detergent that requires a rinse, mist the area with clean water after the detergent washing and wipe it dry. Always work toward the exit door and clean at least two feet beyond the contained area. For carpeted floors HEPA vacuum the area that was under the poly sheeting and at least 2 feet beyond it. Transfer all debris bags to the outside, sealing them by twisting the bag top and folding it over on itself. Use duct tape to secure the fold. Before the bags are sealed, gently release the air in the bag to avoid debris dust blowing out the bag.

Step 8. From outside the house, gently remove your personal protection clothing and dispose with other debris. Using disposable “baby wipes” clean yourself and respirator before entering your work vehicle or re-entry into the home. Dispose the wipes with other debris and secure your respirator in its protective container.

Step 9. Before allowing occupants to re-enter the work area, visually inspect the area for dust – if necessary repeat HEPA vacuum and wet cleaning.

Step 10. Dispose of wash and rinse water by filtering the debris out of the water, using a paint filter and flushing the water down the toilet. The paint filter with the debris must be disposed with other LSW debris, in 6 mil plastic bags.
EXTERIOR CLEANUP

Exterior clean-up sequence and practice are similar to interior clean-up in many ways; therefore, review the 10 steps for interior clean-up listed above. The main point of cleaning after an exterior job is not to let dust spread beyond the work area and to focus specifically on the areas that children could have access to such as bare soil, play areas, exterior porches and exterior window sills. Always inspect beyond the work area. Collect and dispose of all paint chips, dust and debris.

If work takes place on an exterior porch or stairwell, HEPA vacuuming, wet cleaning and mopping, in addition to a thorough visual inspection, should be used to clean the work area. For such jobs, the cleanup can be similar to cleanup after interior jobs. Collect and dispose of any dust or debris with the containment plastic in secured 6-mil poly bags.

A thorough visual inspection is the main part of checking your clean-up after an exterior job. You should collect and dispose of any visible paint chips, wood chips and debris found during the visual inspection. You may notice that the processes of cleanup and checking your work are similar for exterior jobs. A visual inspection is conducted once while cleaning and again after completing cleanup to check your work. Both visual inspections should be thorough and focus on collecting and disposing all visible paint chips, dust and debris.
Some states have enacted more stringent waste management and disposal regulations. Weatherization crews must be aware of state and local regulations concerning hazardous and solid waste management and disposal.

Some examples of LSW waste include:
- Protective sheeting used for containment
- HEPA filters
- All paint chips, dust and dirty water
- Used clean-up and rinse cloths, baby wipes and mop heads
- Protective clothing, respirators, gloves
- Painted Housing components (windows, doors and other building materials)
- Painted duct work and furnace components

All waste should be handled carefully and sealed in 6-mil plastic bags (or 2 doubled-up plastic garbage bags). Large painted housing components such as doors and windows; should be wrapped and sealed with duct tape in 6-mil plastic sheeting and disposed along with your waste. Always collect, bag and seal your waste at the work site and in the work area. Do not carry waste to another room or another area before bagging and sealing the waste. Once outside, store all waste in a secure container or dumpster until disposal. Limit on-site storage time. When transporting the lead contaminated debris, make sure that it is not exposed in an open truck bed. If it must be transported in an open vehicle, cover the debris bags securely with a tarp or other heavy covering to prevent any debris from blowing out.

**Gooseneck Seal** the bag with duct tape - sealing them by twisting the bag top and folding it over on itself. Use duct tape to secure the fold. Before the bags are sealed, gently release the air in the bag to avoid debris dust blowing out the bag.

**Wastewater.** Always be aware of state and local regulations regarding wastewater disposal.

Wastewater used for clean-up should be poured down the toilet if local regulations allow for such disposal. Never dump this water down a sink, storm drain, on the ground, or in a bathtub. Before disposal, wastewater should be filtered using a disposable paint filter. If LSW has been practiced, there should very little waste water, as rags, etc. should never be rinsed and reused.
What is LSW? Lead Safe Weatherization (LSW) is a set of protocols to be used when disturbing surfaces that may have lead-based paint, that will reduce and control the amount of lead dust and paint chips that are generated. The protocols, when designed and followed properly, address compliance with applicable regulations, including state and local regulations, and may reduce the risk of liability associated with the work. The protocols require training to gain the understanding of lead-based paint hazards and their harmful effects and to acquire skills in reducing the lead dust generated when painted surfaces are disturbed in the course of installing energy efficiency measures. The protocols involve setup and cleanup practices that contain the spread of the lead dust and debris (generated from the weatherization activities) when the work is finished. (WPN 02–6 issued July 23, 2002)

1Q: Why should I be concerned about lead as a weatherization worker?  
1A. Lead is toxic to humans, especially children. It can cause a wide variety of health problems even with very low levels of exposure. Paints for residential use manufactured before 1978 contained various amounts of lead. If you are disturbing lead-based paint while performing weatherization work you may be exposing your self and others to lead.

2Q. Does all paint contain lead?  
2A. No. Paints manufactured prior to 1978 may have been manufactured with lead or had lead added by the painters. In 1978 the Consumer Product Safety Commission banned the use of lead in residential paints. Therefore any paint produced prior to 1978 should be considered to contain lead until it is tested and the amount of lead determined.

3Q. Where can lead-based paint be found?  
3A. Typically it is only found in homes built prior to 1978, the year CPSC banned its use in residential paint. Be aware however, that it can still be found in paints intended for industrial use, such as for steel bridges, heavy equipment and highway paint.

4Q: Do I have to take lead samples before I start to weatherize a home?  
4A. No. If you are working in a home built prior to 1978 and do not have the paint tested then you must assume it contains lead and use lead-safe weatherization techniques.

5Q. What are Lead-Safe weatherization techniques?  
5A. Lead-safe weatherization techniques minimize the production of dust, prevent the spread of dust generated and include thorough cleaning of the work area once the work is completed.
6Q. What does "work-wet" refer to? (cleaning and dust-reduction products and cleaning products)
6A. Work wet refers to the use of water or some other material such as shaving cream to trap dust and suppress dust as it is made. Any time an area of paint is to be disturbed it should be kept wet.

7Q. What does HEPA filter mean?
7A. HEPA filter means High Efficiency Particulate Air filter. A HEPA filter has a particle removal efficiency of no less than 99.97% for particulate as small as 0.3 micrometers in diameter.

8Q. How does lead get into the body?
8A. Lead is usually inhaled as dust or ingested (swallowed) as dust or paint chips.

9Q. What personal protective equipment and clothing should I wear when conducting Lead-Safe Weatherization?
9A. You should at least be wearing a properly fit tested and approved respirator with HEPA filters. It is also highly recommended that you wear disposable overalls with head and foot coverings to prevent contaminating your clothes with lead dust. Using disposable protective clothing also can prevent the spread of lead dust by taking them off in the work area and bagging them for disposal there.

10Q. What is an approved respirator for working with lead-based paint?
10A. Any respirator and filter cartridges used for protection from lead must be approved by the National Institute of Occupational Safety and Health (NIOSH).

11Q. Are there regulations for doing weatherization if lead-based paint is present.
11A. Yes. The Occupational Safety and Health Administration has specific regulations to protect employees from lead exposure. The Environmental Protection Agency and the U.S. Department of Housing and Urban Development also have regulations for work done in housing and child occupied facilities identified in the Residential Lead-Based Paint Hazard Reduction Act of 1992, also known as Title X (ten).

12Q. How do I know that I am not being exposed to unacceptable levels of lead dust when I am conducting Lead-Safe Weatherization?
12A. The only way to determine what exposure levels are is to do personal monitoring using sampling pumps and filter cassettes. The filter cassettes will require laboratory analysis to determine the concentration of lead you were exposed to, therefore you will not know until after you are done with the work. For this reason it is highly recommended that you always use respiratory protection when disturbing known or suspected lead-based paint.

13Q. Can anybody do personal air monitoring?
13A. Yes, as long as they are performing the sampling according to a NIOSH or OSHA approved sampling method.

14Q. Can occupants be in the house when I am conducting Lead-Safe Weatherization?
14A. Yes, but they must be prohibited from entering the work area. The work area usually includes an area of at least five (5) feet out in each direction from the painted area being disturbed.

15Q. What are the advantages and disadvantages of the "work-wet" method versus using HEPA-connected equipment?
15A. Cost associated with HEPA equipment engineering controls are a primary advantage. In many instances, time is also saved in labor associated with staging and use of shrouded equipment. There is also the potential for equipment failure or accidental contamination of adjacent areas when utilizing HEPA-connected equipment.

16Q. What work-safe method is recommended for cleaning a HEPA vacuum?
16A. HEPA vacuum equipment may be decontaminated before leaving the site utilizing another vacuum or wet wiping the canister. Remember to always tape shut hoses prior to shutting the machine off and removing the equipment from the job site.

17Q. Upon completion of the weatherization project how should I dispose of lead-containing debris?
17A. See EPA Clarification Regarding Household Waste Exemption for RCRA in Appendix D of this manual.

18Q. How do I assure the home is Lead-Safe when the weatherization project is completed?
18A. Each Weatherization department may have different policies for releasing residential improvement spaces by to the resident. These may include visual inspection criteria only and reliance on distribution of the EPA Booklet “Protect Your Family from Lead in Your Home.” Other policies may exist or be adopted that require clearance wipe sample requirements be met.

19Q. When do I know to walk-away or “Defer” from a Weatherization project due to lead-based paint?
19A. Each Weatherization program should consider the DOE Lead-Based Paint Weatherization Policy presented in Appendix B for pre-1978 housing stock and consider the level of training and equipment Weatherization crews have at their disposal for addressing and controlling lead in the form of dust or paint chips.