

Lead-Based Paint Regulations: An Update of Best Practices

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Introduction

Since the early 1970's the Federal government has taken several steps to reduce worker and building occupant health risks due to exposure to LBP. Workers encounter lead and lead-based paint (LBP) in a variety of occupational situations which require compliance with USEPA, OSHA regulations and possibly HUD guidelines. LBP can be found in pre-1978 residential structures, on structural steel such as bridges and water towers regardless of vintage, and other industrial surfaces primarily used for its durability or as a protective coating. While this paper focuses primarily on exposure to LBP, the work practices apply generally to other lead exposures as well.

Workers involved with the disturbance of LBP coatings risk exposure to lead fumes, dust, or paint chips. Inhalation or ingestion of lead can cause serious bodily harm and even death. Failure to utilize safe work practices during the disturbance of LBP coatings can have consequences resulting in lead exposures to other workers, non-workers and building occupants. Children (6 years of age and under) are especially susceptible to the toxic effects of lead and are protected from such exposures by USEPA and public health regulations. Improper disturbance can also create environmental contamination and generate regulated hazardous wastes. This presentation will cover best practices utilizing the lead paint regulation and guidance issued by OSHA, USEPA, and HUD when LBP is disturbed during demolition and renovation activities.

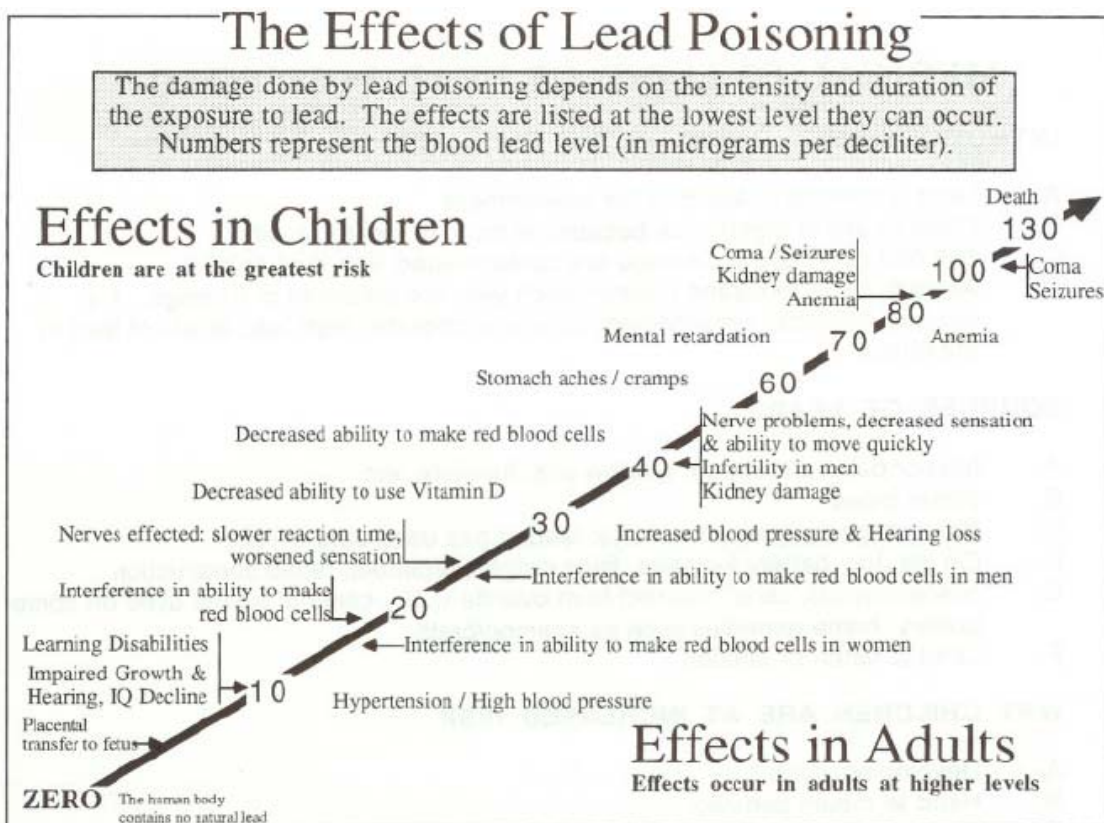
History and response to health effects

Archaeologists have found lead pigment on buildings built around 3000 B.C. (*Anderson 4*). Even after 5000 years, the color on these structures is still visible. (*Mueller 33*) It is the durability of LBP to weathering and moisture that made it a common additive in paints for centuries. The health effects of lead exposure have also been known for centuries. As early as the 4th century B.C., Hippocrates observed leads adverse health effects on miners and metallurgists (ATSDR B-

1). Although the hazards have been recognized since ancient times, lead poisoning is still common in the United States.

When lead enters the human body, it is sequentially deposited into the blood, soft tissue and bones. Lead can remain in the blood for a period of one week, in soft tissue (muscles and organs) for a month and in the skeleton for over 30 years. The body will naturally eliminate lead over time. Lead serves no metabolic purpose in the body, and its presence can affect any and all of the body's functions, including the central nervous system, reproductive system, skeleton and renal and hepatic function.

The health effects of lead depend on the victim's age, health and nutrition. Lead is perceived by the body as other minerals, and a nutritional lack of those minerals leads to a more rapid uptake of the lead. Health effects range from fatigue, memory loss and aggressive behavior to brain damage, loss of intelligence (IQ points), coma and death. Some of these health effects are reversible. However, especially in children under age 6, whose bodies are still developing, the damaging effects of elevated blood lead levels can be permanent. A graph indicating health effects relative to exposure for both children and adults follows.



The Center for Disease Control (CDC) estimates that 1 in 22 children in the United States have high levels of lead in their blood (*DEH 1*). The USEPA estimates 900,000 children under the age of 6 have blood lead levels above the level of concern (*DEH 2*). The main source of lead poisoning in children is ingestion of lead dust or lead paint chips. To reduce children's exposure to lead, the Residential Lead-Based Paint Hazard Reduction Act (Title X) requires that work involving the renovation and rehab of pre-1977 residential housing must minimize the disturbance of LBP and ensure the proper cleaning prior to reoccupancy by children. HUD and USEPA have developed regulations and guidance for abating LBP hazards and conducting safe work activities when disturbing LBP in various types of residential properties ranging from large public housing apartments to private single family homes. These "safe work practices" will be discussed later.

According to OSHA, inhalation of airborne lead is generally the most important source of occupational lead exposures to workers. In 1991 and 1992 The National Institute of Occupational Safety and Health (NIOSH) released reports documenting lead poisoning in workers engaged in abrasive blasting, maintenance, repainting and demolition of bridges (*NIOSH 1,2*). These studies identified worker exposures to lead up to nearly 600 times current OSHA exposure levels. In 1990, NIOSH set a national goal to eliminate worker exposures resulting in blood lead concentrations greater than 25 micrograms per deciliter (25 µg/dl) of whole blood. OSHA then began to develop a comprehensive standard regulating lead exposures in construction. OSHA lead compliance issues for worker safety will also be discussed a little later in the presentation.

The facts regarding the dangers of lead paint are well documented. Regulations and guidelines have been developed by the Federal government to address these hazards during renovation, rehab, and demotion activities. The dilemma for employers is determining which regulations and guidelines apply to the type of LBP disturbance that might be involved in their project. Does a plastic bubble have to cover a home where LBP wood siding is being resided? What if we are removing LBP from a water tower? Do workers removing a LBP covered window require disposable work suits and HEPA filtered respirators or will coveralls and paper dust masks do? How clean is clean on a job? All of these questions and more are asked daily by small rehab contractors, large building owners, construction companies and homeowners. The answer to these questions depends upon many factors including the type of structure involved, the kind of work activities involved with LBP disturbance and the level of exposure encountered. Most projects involve one or more USEPA, HUD or OSHA guidelines or regulations. Many projects involve overlapping regulations which can be a challenge to comply with in the field. A review of the major lead paint regulations will illustrate this point.

Regulatory Overview

In the early 1970's the Federal government took a number of steps to reduce human exposures to lead. The use of lead in house paint and solder piping used in drinking water systems has been banned. Lead additives have been removed from most gasoline. Additionally, the Consumer Product Safety Commission has assisted in the identification and awareness of lead found in many common consumer products including ceramics, vinyl mini-blinds, crayons and candles. Lead paint was banned in residential paints used after 1977. However, industrial and commercial uses of LBP have not been banned. It is the disturbance of pre-1978 residential paint and all lead containing industrial and commercial paints that have promulgated guidance information and

regulations by HUD, USEPA and OSHA. “Target housing”, that is, dwellings where it is possible that children under age six might reside have very stringent guidance and regulations. However, the guides and regulations apply to residential structures, commercial properties and industrial settings where lead paint is disturbed during maintenance, renovation and demolition activities.

OSHA on worker safety

The Occupational Safety and Health Administration (OSHA) has had regulations pertaining to occupational lead exposure since 1971 for construction and general industries. In October 1992, the Congress passed Section 1031 of Title X of the Housing and Community Development Act of 1992 requiring OSHA to issue an interim final lead standard for the construction industry. This interim rule was published on May 4, 1993 adding new section 1926.62, which will remain in effect until OSHA issues a final standard. OSHA’s lead in construction standard applies to all construction work where an employee may be occupationally exposed to lead. This standard is not specific to lead-based paint but also includes metallic lead, all inorganic lead compounds, and organic lead soaps. All construction, alteration and repair activities are covered by the standard.

The OSHA Construction Industry (29 CFR 1926.62) and General Industry (29 CFR 1910.1025) Standard for lead set the Action Level (AL) at 30 $\mu\text{g}/\text{m}^3$ (micrograms per cubic meter) of air and the permissible exposure limit (PEL) at 50 $\mu\text{g}/\text{m}^3$ of air averaged over an 8-hour workday. For longer workdays, 400 μg must be divided by the hours worked to arrive at the exposure limit for those workers. When workers are or may be exposed above the AL for 30 or more days per year, medical surveillance is required. The standard requires employers to utilize engineering, work practices, and administrative controls, when feasible, to reduce and maintain employee lead exposure to at or below the PEL.

Medical surveillance for lead includes blood lead level (BLL) and zinc protoporphyrin (ZPP). ZPP is chemical which is indicative of long term exposure, while BLL indicates only the current level of lead in blood, and gives no idea as to the worker’s exposure history. Medical surveillance must be performed every six months. However, when results of the BLL are >40 $\mu\text{g}/\text{dl}$ (micrograms per deciliter) of blood, the interval is reduced to every two months until two consecutive BLLs are <40 $\mu\text{g}/\text{dl}$ of blood. If the BLL exceeds 60 $\mu\text{g}/\text{dl}$, or if the average of the three most recent BLLs exceeds 50 $\mu\text{g}/\text{dl}$, OSHA mandates medical removal from work having an exposure greater than the AL. During medical removal the employer must provide alternate work if available. Additionally, OSHA requires other worker protections regarding medical surveillance, including the right to obtain a second opinion.

A worker exposed over the PEL requires the employer to provide respiratory protection, protective work clothing and equipment, change areas, hand washing or shower facilities, biological monitoring, and training. An action level is the level at which an employer must begin to take certain actions or compliance activities such as medical surveillance and training of employees. Until an employer performs an exposure assessment and documents worker exposures below the PEL, the employer must treat employees performing certain operations as if they were exposed above the PEL triggering compliance activities. Work tasks involving LBP that employers must treat as exceeding the PEL (unless exposure monitoring proves otherwise) are:

- ❑ Manual demolition of structures (e.g., dry wall), manual scraping, manual sanding, and use of heat gun where lead containing coatings or paints are present;
- ❑ Abrasive blasting including cleanup activities, enclosure movement and removal;
- ❑ Power tool cleaning;
- ❑ Spray painting with lead-containing paint;
- ❑ Rivet busting or welding, cutting, or burning on any structure where lead-containing coatings or paint are present;

If the initial determination through air monitoring that the employee exposure is below the action level, further exposure determination or OSHA compliance activities need not be repeated unless there is a change in processes or controls. This is an important activity to achieve for an employer who has work practices which typically do not generate significant levels of airborne lead. If employee exposure is found to be between the AL and PEL or above the PEL then additional exposure monitoring and compliance activities are required. Refer to the OSHA resource section of this document for additional information.

Jobs involving exposures over the PEL or where no initial determination is conducted must establish and implement a written compliance program to reduce employee exposures to or below the PEL. The written program must be revised every 6 months and include the following components:

- ❑ A description of each activity in which lead is emitted (e.g., equipment used, materials involved, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices);
- ❑ Specific plans to achieve compliance and engineering plans and studies where engineering controls are required;
- ❑ Information on the technology considered to meet the PEL;
- ❑ Air monitoring data that document the source of lead emissions;
- ❑ A detailed schedule for implementing the program, including copies of documentation (e.g., purchase orders for equipment, construction contracts);
- ❑ A work practice program including regulations for the use of protective work clothing and equipment and housekeeping and hygiene facility guidelines;
- ❑ An administrative control schedule for job rotation, if used;
- ❑ A description of arrangements made among contractors on multi-contractor sites to inform affected employees of potential exposure to lead and their responsibility to comply with this standard;
- ❑ Any other relevant information.

The OSHA website has interactive computer software which can assist an employer with compliance including writing a job specific compliance program. Additional support for lead compliance programs are listed in the resources listing of this document.

HUD Guidelines and targeted housing

The Lead-Based Paint Poisoning Prevention Act (LBPPPA) of 1971 was adopted to reduce levels of lead in paint in federally financed and subsidized housing. It was amended in 1973 to require HUD to reduce or eliminate the hazards of LBP poisoning in federally financed and subsidized housing. In 1989 HUD developed comprehensive technical guidelines on testing, abatement,

cleanup, and disposal of LBP in public and Indian housing. An official Guideline was published in 1990 followed by extensive revisions in 1995.

The 600+ paged “Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing”, provide detailed, comprehensive, technical information on how to identify and address LBP hazards safely and efficiently. The “Guide” lists three types of LBP hazard control: interim controls, abatement of LBP hazards, and total LBP abatement. Interim controls are designed to address hazards quickly, inexpensively, and temporary, while abatement is intended to produce permanent solutions. The goal of the document is to help property owners, private contractors, and government agencies sharply reduce children’s exposure to lead without unnecessarily increasing the cost of housing.

HUD developed this document to complement regulations, other directives, and other guidelines to be issued by HUD, USEPA, OSHA and CDC. The “Guidelines” were developed to provide more comprehensive and complete guidance than do most regulations as to how activities related to LBP should be carried out and why certain measures are recommended. The “Guidelines” **are not** enforceable by law unless a Federal, State, or local statute or regulation requires adherence to certain parts of the “Guidelines”. Employers and building owners need to realize that the guides are designed for housing where small children are present. The HUD Guidelines are not designed for commercial or industrial LBP disturbance activities. Employers working in single family and multi-family LBP activities can benefit from the mountain of guidance provided by HUD. Refer to the resource section of this document for additional HUD information and web links.

USEPA on training, clearance testing, safe work practices, and waste disposal

The overall purpose or policy of the USEPA lead office is to formulate and execute programs which will promote the reduction of human exposure to lead hazards. The Residential Lead-Based Paint Hazard Reduction Act (Title X) developed a comprehensive federal strategy for reducing lead paint hazard exposure. The USEPA has developed standards, guidance documents and training programs for employers performing renovation, remodeling, painting and other activities in a manner that minimizes creation and dispersal of lead-containing dust and protects residents, especially children, from possible exposure. The USEPA mandates safe work practices on HUD and other targeted housing and recommends them elsewhere. There is currently an initiative to expand safe work practices to other non-target housing and LBP activities.

Title X also provided the authority for the following regulations by amending the Toxic Substances Control Act (TSCA) to include Title IV (Lead Exposure Reduction). Issues that have been delegated to the USEPA include:

- ❑ National Lead Laboratory Accreditation Program (405(b)): Establishes protocols, criteria, and minimum performance standards for laboratory analysis of lead in paint, dust, and soil.
- ❑ Hazard Standards for Lead in Paint, Dust, and Soil (403): Establishes standards for lead-based paint hazards and lead dust cleanup levels in most pre-1978 housing and child-occupied facilities. **Clearance levels specified here currently only apply to HUD/State/local targeted LBP projects and are a guide for other residential LBP projects.**
- ❑ Training & Certification Program for Lead-Based Paint Activities (402/404): Ensures that individuals conducting lead-based paint abatement, risk assessment, or inspection are

- properly trained and certified, that training programs are accredited, and that these activities are conducted according to reliable, effective and safe work practice standards.
- ❑ Pre-Renovation Education Rule (406(b)): Ensures that owners and occupants of most pre-1978 housing are provided information concerning potential hazards of lead-based paint exposure before certain renovations are begun on that housing.
 - ❑ Disclosure Rule (1018): Requires disclosure of known lead-based paint and/or lead-based paint hazards by persons selling or leasing housing constructed before the phase out of residential lead-based paint use in 1978.
 - ❑ Lead-Based Paint Debris Disposal: Regulatory Status of Waste Generated by Contractors and Residents from Lead-Based Paint Activities Conducted in Households.

Proposed revisions for training, accreditation and certification

Section 402(c)(3) of TSCA directs USEPA to revise regulations codified at 40 CFR 745 subpart L to ensure that individuals engaged in renovation and remodeling activities that create lead-based paint hazards are properly trained; that training programs are accredited; and that contractors engaged in such activities are certified. Currently only those contractors, supervisors and workers engaged in federally funded HUD projects or those working on Federal Public or Indian Housing are required to be certified by accredited training providers. Most States also require licensing for workers, supervisors and contractors performing HUD work as well. **This proposed revision would require training and certification for LBP work in most other residential, public and commercial properties including bridges and steel structures.**

Title X, the Lead-Based Paint Hazard Reduction Act of 1992, P.L. 102-550, required that three agencies, OSHA, HUD and EPA, develop a national strategy to "...build the infrastructure necessary to eliminate lead-based paint hazards in all housing." While many provisions of Title X have been promulgated by the various agencies, EPA has been slow to propose regulations regarding renovation activities in housing that does not receive federal subsidies. The HUD Lead-Based Paint requirements are located in 24 CFR Part 35. They regulate Housing receiving Federal monies, requiring "Lead Safe Work Practices" with Lead Dust Wipe and Visual Clearances at conclusion of Lead Mitigation and Abatement. The OSHA Construction Industry standards protecting workers are at 29 CFR 1926.62.

On November 5, 2005 Sen. Barack Obama, D-Ill., stated publicly that, "*The EPA has reneged on its commitment to me, and to parents and children across the country, to issue simple rules that would prevent thousands of kids from needlessly suffering from lead-paint poisoning,*" and put a hold on President Bush's nominee to a key Environmental Protection Agency post because the agency has failed to meet a promised deadline for issuing regulations for lead paint exposure from house remodeling. In response to Senator Obama's action, the EPA published a proposed regulation addressing these complaints.

On January 10, 2006 EPA proposed requirements to minimize the introduction of lead hazards resulting from the disturbance of lead-based paint during renovation, repair, and painting activities in most housing built before 1978 (71 FR 1588). The proposal introduces lead training, certification, and safe work practice requirements for contractors involved in these activities. It is one component of a comprehensive program to ensure the use of lead-safe work practices that will also include training and an education and outreach campaign targeted at both workers and

consumers. EPA believes this new program will further its goal to eliminate childhood lead poisonings as a major public health concern by the year 2010.

The proposed rules would apply to target housing, defined as residential property constructed before 1978 and excluding housing for the elderly or persons with disabilities (unless any children under age 6 resides or is expected to reside in such housing) or any 0-bedroom dwelling. The rule requires that renovators be trained in the use of lead-safe work practices, that renovators and firms be certified, that providers of renovation training be accredited, and that renovators follow renovation work practice standards as described in the standard. The regulation would apply to all persons who do renovation for compensation, including renovators, painters and other specialty trades as well as maintenance workers in multi-family housing. The proposed regulation does not apply to owner-occupied housing where children under six do not reside, renovations in areas that are free of LBP and minor repairs that disrupt 2 square feet or less of painted surface. It will become effective in two phases; first applying to all renovation for compensation performed both where a lead-poisoned child resides, in rental target housing built before 1960 and owner-occupied housing built before 1960 unless the owner certifies that no children under age six reside there. The second phase involves all rental target housing and owner-occupied housing built between 1960 and 1978 where a child under age six resides.

The regulation calls for renovators and renovator firms to be certified and use certified renovators who would provide on-the-job training for uncertified workers. Work practices would include posting of signs defining the work area and warning occupants and other persons to remain outside of the work area; isolating the work area to contain visible dust and debris; and containing waste generated by the renovation activities.

The certified renovator working for the renovator firm would be responsible for either performing or directing uncertified workers performing regulated renovation activities; providing training for uncertified workers; and being present at the work site during “key stages of a renovation”, and at other times to be available on-site or by telephone. The certified renovator would also be able to use an acceptable test kit to determine whether LBP is present in affected areas. As part of the proposed rulemaking, EPA is also publishing a new lead hazard information pamphlet for renovation activities, titled “Protect Your Family from Lead during Renovation, Repair and Painting”.

The rules as proposed are very interesting, as much for their inconsistency as for setting standards that are less stringent than lead-based paint (LBP) regulations set by other agencies and for removing some of the sacred tenets of LBP management. For these reasons, best practices for lead paint disturbance are covered later in this paper.

The Lead-based Paint Debris Disposal Proposed Rule

The USEPA regulates LBP waste/debris as hazardous and non-hazardous depending upon where and how the LBP is disturbed. This rule allowed for easier disposal of lead-based paint debris generated in residences or public and commercial buildings. The rule was developed out of a recognition that the Resource Conservation and Recovery Act (RCRA) subtitle C regulations for such disposal as hazardous waste were burdensome, time consuming and costly - especially for average homeowners who are considering whether or not to have their homes abated. The proposed standards will allow disposal of lead-based paint debris in specified alternative, non-hazardous landfills (i.e., construction and demolition (C&D) landfills) without requiring a

hazardous waste determination. To accomplish this, the proposed rule shifted the regulations for management and disposal of lead-based paint debris from RCRA to a program under the Toxic Substances Control Act (TSCA). The proposed TSCA standards do not apply to the lead-based paint debris or soil generated by homeowners or contractors engaging in renovation activities in homes. Rather, this debris is covered under the household hazardous waste exclusion in RCRA subtitle C (cite: 40 CFR 261.4(b)(1)).

Until the USEPA finalizes a disposal rule employers and homeowners can refer to The Cotsworth Solid Waste Memo / July, 2000. This memorandum clarifies the regulatory status of waste generated as a result of lead-based paint activities (including abatement, renovation and remodeling) in homes and other residences. Since 1980, EPA has excluded household waste from all types of RCRA hazardous wastes under 40 CFR 261.4(b)(1). The household exclusion applies to waste generated by either residents or contractors conducting lead-based paint activities in residences. As a result of this clarification, contractors may dispose of hazardous lead-based paint wastes from residential lead paint abatements as household garbage subject to applicable state regulations. Note, however, that some lead-based paint waste from residential LBP activities may still be subject to more stringent hazardous waste requirements in certain states, localities, territories and tribal areas. **LBP waste and debris generated from non-residential projects must be tested to determine if RCRA Hazardous Waste regulations apply. The only exclusion is for LBP adhered to building components during demolition which can be handled as C & D waste.**

Best Practices for LBP Activities

The regulatory review above is a brief description of possible regulatory requirements or guidelines that may apply to a maintenance, construction, renovation, or demolition project which involves LBP. The question then becomes, “How do we work with LBP in compliance with regulations while protecting workers and the public?” This can be best illustrated with case studies. The two projects selected for discussion identify two extremes of LBP disturbance: removing a lead painted window in a home by a small renovation/rehab contractor versus the removal of lead paint from a structural steel bridge over a river using professional lead abatement contractors.

Replacing a window that has been painted with LBP

The removal of windows painted with LBP involves HUD and USEPA guidelines for safe work practices, clearance testing, and waste disposal. The OSHA lead in construction standard compliance components apply unless air monitoring is performed and worker exposures to airborne lead are not above the permissible exposure level. Fortunately there are several resources available to assist employers with compliance with these regulations and for establishing best practices. Refer to resource guide for additional information.

NEVER FORGET – Lead dust is your enemy on LBP residential projects!!! The “Safe Work Practices” teach simple principles: 1) avoid activities that produce high levels of lead dust or fumes by prohibiting certain activities and avoiding disturbing (creating dust) and spreading lead-based paint to the greatest extent feasible, 2) protect occupants and workers, and 3) perform proper cleaning and verify with clearance testing.

- Prior to work starting
 - Determine if the work will take place from the interior of the residence or from the exterior. Exterior work may appear to be more difficult (especially for windows above grade) however there are great advantages for avoiding interior work. Interior work involves relocating occupants and furnishings. Interior work also requires clearance testing where most exterior projects do not.
 - OSHA requires a lead compliance program with components as outlined previously. HUD projects also require a worksite compliance plan with similar components to OSHA except that HUD additionally addresses occupant notification and clearance testing. If respirators are used, a written respiratory protection plan is required by OSHA. OSHA also requires a hazard communications plan onsite including material safety data sheets (MSDS) for chemicals used on the job site.
 - EPA and HUD would require “safe work practice” training if the window is being replaced for renovation purposes. An employer could easily become an approved trainer to instruct their own employees. Certified contractors trained in abatement by an accredited training provider would be required by EPA for targeted housing (federally funded or child occupied) if the intent of removing the window was to eliminate a lead hazard (note that some States also require lead licenses). If respirators are used OSHA requires employees to have documented respirator training. Finally, hazard communication training on chemicals used on the jobsite is also an OSHA requirement.
 - Personal protective equipment specific for lead would be required including washable or disposable coveralls, N100 respirators, gloves and wash facilities, unless the employer conducts exposure monitoring documenting compliance with the PEL. HUD and EPA recommend a disposable painters hat, coveralls (either disposable or stored in a bag onsite), and a N100 disposable respirator. Gloves are optional, however frequent hand washing is recommended (pre-moistened wipes are also suggested). If a respirator is issued then the employer is required by OSHA to have a written respiratory protection program including medical surveillance, fit testing and training for employees. Chemical use (such as paint removal products) may require eye/face/hand/body and respiratory protection above and beyond protective equipment discussed above.
 - Medical surveillance including biological monitoring (blood lead level tests) is required by OSHA if no employee lead exposure monitoring has been performed. If exposure monitoring indicates employee exposure to airborne lead is over the AL or PEL, medical surveillance is also required. Finally, as mentioned above, the use of respirators triggers the medical surveillance requirements of OSHA’s respiratory protection standard.

- Work site preparation and set up for interior work
 - Restrict access to the work area. OSHA requires establishing a regulated area where the PEL is expected to be exceeded. Eating, drinking and smoking are prohibited in the restricted area. This requirement is performance based. Some jobs require a sign or barrier tape while other jobs may require fences or lockable barriers.

- Remove drapes, curtains, furniture, and rugs within 5 feet of the work area. Large furniture that cannot be moved should be covered with protective sheeting. A protective drop cloth should be securely placed immediately under the work area extending at least 5 feet out (lead dust typically falls within 5 feet of a work area).
 - Avoid spreading lead dust! Bring in necessary supplies prior to the start of the job to avoid having to step off the protective sheeting. Protect shoes with disposable shoe covers and remove the covers upon leaving the work area. Other options are to wipe the bottom of shoes with a damp towel, clean off shoes with a tack pad (large sticky pad that removes dust from bottom of shoes), or remove shoes when leaving the work area.
- Cleanup and waste disposal
- Use special cleaning techniques. Pick up large paint chips with damp paper towel and/or mist then push into dust pan. Wet wipe and HEPA vacuum all surfaces. Lead cleaners and heavy scrubbing will be necessary multiple times to remove the lead dust. Using dry sweeping or regular shop vacuums are prohibited cleaning methods.
 - All debris, protective sheeting, and other disposables should be bagged prior to leaving the work area.
 - Consider painting the surfaces prior to performing clearance testing.
 - The waste including the removed window is classified by USEPA as a non-hazardous residential waste. Refer to local agencies for disposal requirements in your area.
- Clearance testing
- HUD and targeting housing projects require clearance testing on interior surfaces and exterior surfaces such as porches. Dust wipes are used to determine if surfaces are safe for reoccupancy.
 - Clearance levels established by the USEPA are extremely low. Surfaces must be clean enough for a toddler to lick, literally! Clearance on a floor surface is $40\mu\text{g}/\text{ft}^2$, a window sill is $250\mu\text{g}/\text{ft}^2$, and window troughs are $400\mu\text{g}/\text{ft}^2$. Clearance tests have to be conducted by certified inspectors or risk assessors and analyzed by USEPA accredited laboratories.
 - Clearance testing documents cleaning is not just construction site clean or even reoccupancy clean. Clearance is nearly clean room clean. Example: Take 100 rooms 10 feet by 10 feet. Evenly spread a half packet of sugar (filled with lead dust) over all 100 rooms. Clearance testing on the floor of all 100 rooms would fail clearance! Remember, dust is your enemy on residential projects.

This “routine” project can become very tedious, time consuming and expensive if OSHA exposure monitoring does not indicate low lead exposure to workers. Most guidance information provided by HUD and USEPA only mention OSHA in passing. Staying under OSHA’s action level will make window replacements involving lead paint safe, efficient and cost-effective for all.

Abrasive blasting of LBP on a structural steel bridge

Abrasive blasting on structural steel is a process that usually involves compressed air to propel the blasting media (coal slag, silica sand, steel shot or steel grit) to the surface being cleaned. Abrasive blast cleaning is used because it is a fairly quick and cost effective way of removing paint, rust and mill scale from a steel structure. Abrasive blasting can result in worker exposures over 100 times higher than OSHA's permissible limit. There are also potential issues with environmental contamination of air, soil and water. The potential for high employee exposures to lead along with significant pollution concerns makes abrasive blasting a heavily regulated activity. Associations have developed several guidance documents to assist employers with regulatory compliance and best work practices for abrasive blasting activities on steel structures. Refer to the resources listing for more information.

- Prior to work starting
 - Determine if the work will take place over ground, water, roads, or railways. Consider weather conditions and loads expected to act on the worksite. Environmental testing may be necessary to establish background levels prior to starting and clearance levels upon conclusion of the project.
 - OSHA requires a lead compliance program with components as outlined previously. The EPA and many local regulatory agencies require containment plans to focus on pollution control as well. Respirators are mandatory so a written respiratory protection plan is required by OSHA. OSHA also requires a hazard communications plan onsite including material safety data sheets (MSDS) for chemicals used on the job site. The use of hearing protection also requires a written program.
 - EPA recommends the use of certified contractors trained in abatement by an accredited training provider. OSHA requires job specific training addressing the hazards at the jobsite (note that some States also require lead licenses). OSHA requires respiratory protection which necessitates the need for employees to have documented respirator training. Also, hazard communication training on chemicals used on the jobsite is also an OSHA requirement. Finally, jobsite hazards may require many more OSHA compliance issues such as fall protection, scaffolding, hearing protection and silica exposure.
 - Personal protective equipment specific for lead would be required including washable or disposable full body coveralls, gloves, shoe covers, and hats. Supplied air type CE abrasive blasting hood respirators are required for those in contained work areas and air purifying P100 respirators for those outside of the blasting area. Wash facilities including showers are required (when feasible). Abrasive blasting involves high noise levels so hearing protection and a written hearing conservation program is usually required. Finally, if silica is used as the blasting agent additional precautions should be taken.
 - Medical surveillance including biological monitoring (blood lead level tests) is required by OSHA. As mentioned above, the use of respirators triggers the medical surveillance requirements of OSHA's respiratory protection standard. Finally, silica use and excessive noise will require additional medical surveillance as specified by OSHA.

- Worksite preparation and setup

- A partial or full containment is usually required by OSHA and EPA for worker protection and pollution control. Most enclosures require ventilation and filtration to reduce lead exposures.
 - Restrict access to the work area. OSHA requires establishing a regulated area where the PEL is expected to be exceeded. Eating, drinking and smoking are prohibited in the restricted area. This requirement is performance based. Some jobs require a sign or barrier tape while other jobs may require fences or lockable barriers.
 - A system has to be constructed to move waste from the blasting area to the storage area through large vacuums, funnels or conveyers.
- Cleanup and waste disposal
- OSHA requires that all surfaces be kept as free as practical of accumulations of lead with cleanup methods that minimize the likelihood of lead becoming airborne.
 - Shoveling, dry or wet sweeping, and brushing may only be used when the use of HEPA filtered vacuuming are not effective.
 - The use of compressed air during is prohibited except under rare conditions.
 - Waste should be segregated into hazardous and special classifications. Wastes typically considered hazardous include paint chips, dust, and contaminated blasting agents. Those materials that typically are not considered hazardous include paint still adhered to structural components, materials used in constructing containments, and disposable suits.
 - Clearance testing is not required on this project by the USEPA.

Abrasive blasting of LBP has a great potential for excessive employee exposures to airborne lead. There is an equal concern for environmental pollution to soil, water, and the air. The projects proximity to water, wetlands, hospitals, schools, daycare, private property and food sources must be incorporated into a sound containment plan. Wastes handling and disposal is also a concern. Finally, elevated jobsites near roads, railways, and other hazardous areas pose more complicated compliance plans. Failure to properly plan and implement a sound project can result in significant human health injuries and environmental pollution.

Conclusion

Disturbance of lead-based paint can trigger several Federal, State and local regulations. The examples sited in this article show the range of work practices from minimal to extreme depending upon the type and location of LBP work being performed. Best work practices should incorporate applicable regulations and guidelines along with specific work practices developed by associations, unions, and other groups. This article concludes with several sources for best work practices on several types of LBP projects.

Resources

Each jobsite is unique. Yet there are many common denominators that involve the disturbance of LBP that apply to similar projects. The Federal government has provided many compliance tools and guidance documents to assist employers and building owners with compliance programs and best practices. Resources from OSHA, USEPA, HUD, CDC and NIOSH provide a wealth of information. However best work practices also come from associations, trade groups, unions, and other parties. Many of these best practices from these groups are also listed. The resources are not an exhaustive list of what is available. Many of these resources will lead you to much more.

These resources are hyperlinked directly to websites. The PDC format may not allow for these links to work. You can obtain a copy of the Microsoft Word format of this document with active hyperlinks on the ASSE's Environmental Practice Specialty website at asse.org or by contacting the author at mundycamp@aol.com.

FEDERAL RESOURCES

Occupational Safety and Health Administration – OSHA

- ❑ [OSHA Website Homepage - www.osha.gov](http://www.osha.gov)
- ❑ [OSHA Lead in Construction Advisor 1.0](#). OSHA Expert Advisor (1999, September) Interactive expert software intended to help users, especially small business, to understand OSHA's Lead in Construction standard.
- ❑ [Lead-Related Construction Tasks and Their Presumed 8-hour TWA Exposure Levels](#). OSHA Technical Manual (TED 1-0.15A), Section V: Chapter 3, Appendix V:3-1. 29 pages, (1999, January 20)
- ❑ [Lead Exposure in Construction \(#1 of 6\), Worker Protection Programs](#). OSHA Fact Sheet 93-47 (1993, January 1), 1 page.
- ❑ [Lead Exposure in Construction \(#2 of 6\), Engineering Controls](#). OSHA Fact Sheet 93-48 (1993, January 1), 1 page.
- ❑ [Lead Exposure in Construction \(#3 of 6\), Housekeeping and Personal Hygiene Practices](#). OSHA Fact Sheet 93-49 (1993, January 1), 1 page.
- ❑ [Lead Exposure in Construction \(#4 of 6\), Protective Clothing](#). OSHA Fact Sheet 93-50 (1993, January 1), 1 page.
- ❑ [Lead Exposure in Construction \(#5 of 6\), Respiratory Protection](#). OSHA Fact Sheet 93-51 (1993, January 1), 1 page.
- ❑ [Lead Exposure in Construction \(#6 of 6\), Medical Surveillance](#). OSHA Fact Sheet 93-52 (1993, January 1), 2 pages.
- ❑ **OSHA Standards**
Construction
 - [1926.62, Lead](#).
 - [App A](#), Substance Data Sheet for Occupational Exposure to Lead
 - [App B](#), Employee Standard Summary
 - [App C](#), Medical Surveillance Guidelines

Environmental Protection Agency – EPA

- ❑ [USEPA Website Home Page – www.epa.gov](http://www.epa.gov)
- ❑ [Lead Paint Safety: A Field Guide for Painting, Home Maintenance, and Renovation Work](#)
- ❑ [National Lead Information Center \(NLIC\)](#): The National Lead Information Center (NLIC) provides the general public and professionals with information about lead hazards and their prevention. NLIC operates under a contract with the U.S. Environmental Protection Agency (EPA), with funding from EPA, the Centers for Disease Control and Prevention, and the Department of Housing and Urban Development.
- ❑ EPA Model Course: [Minimizing Lead-Based Paint Hazards During Renovation, Remodeling, and Painting](#)
- ❑ [Lead-Based Paint Maintenance Training Guide: Work Smart, Work Wet, and Work Clean to Work Lead Safe](#) (Prepared by the National Environmental Training Association (NETA) under a grant from the EPA)
- ❑ [TSCA and RCRA Proposed Rulemakings for Lead-Based Paint Debris Disposal](#): Seek to establish new standards for the management and disposal of lead-based paint (LBP) debris generated by individuals or firms.
- ❑ [Hazard Standards for Lead in Paint, Dust, and Soil \(403\)](#): Establishes standards for lead-based paint hazards and lead dust cleanup levels in most pre-1978 housing and child occupied facilities.
- ❑ [Notice of Availability; New Renovation Studies \(March 16, 2007\)](#): Two new studies assessing hazards associated with renovation activities have been completed by EPA and a home renovation association.

U.S. Department of Housing and Urban Development

- ❑ [HUD Office of Healthy homes and Lead Hazard Control](#)
- ❑ [HUD Lead Training Materials](#)
- ❑ [HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing](#)

Center for Disease Control – CDC

- ❑ [Centers for Disease Control Resources and Guidance](#)

National Institute for Occupational Safety and Health (NIOSH)

- ❑ [NIOSH Website Home Page http://www.cdc.gov/niosh/homepage.html](http://www.cdc.gov/niosh/homepage.html)
- ❑ [Protecting Workers Exposed to Lead-Based Paint Hazards](#)
- ❑ [NIOSH Documents and Publications](#)

ASSOCIATIONS/GROUPS

National Institute of Building Sciences (NIBS)

- ❑ [NIBS Website Home Page –www.nibs.org](http://www.nibs.org)
- ❑ [Lead-Based Paint Operations & Maintenance Work Practices Manual for Homes and Buildings](#)

Steel Structures Painting Council (SSPC – The Society for Protective Coatings)

- ❑ [SSPC Website Home Page - www.sspc.org](http://www.sspc.org)
- ❑ Ask SSPC: [Chemical stripping](#) of lead-based paint.
- ❑ [SSPC books and videos on LBP removal](#)

Construction Safety Council (CSC)

- ❑ [CSC Website Home Page – www.buildsafe.org](http://www.buildsafe.org)
- ❑ [Lead Safety Program](#)
- ❑ [Hazard Communications for Construction](#)

Other Sources

- ❑ [Electric Library of Construction Occupational Safety and Health – Lead Topics](#)
- ❑ National Assoc. of the Remodeling Industry [Lead safety during renovation work](#)

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National Institute of Occupational Safety and Health (NIOSH). *NIOSH Alert – Request for Assistance in Preventing Lead Poisoning in Construction Workers*, Cincinnati: U.S. Department of Labor, April 1992

Lead Elimination Action Drive (LEAD), *various documents*, 2125 W. North Ave., Chicago, IL 60647, 312-292-4990