The High Cost of Improper Removal of Lead-Based Paint from Housing: A Case Report

David E. Jacobs,[1] Howard Mielke,[2] and Nancy Pavur[3]

[1]Office of Healthy Homes and Lead Hazard Control, U.S. Department of Housing and Urban Development, Washington DC, USA; [2]Xavier University, College of Pharmacy, New Orleans, Louisiana, USA; [3]United Parents Against Lead, New Orleans, Louisiana, USA

The costs of lead-based paint hazard control in housing are well documented, but the costs of cleanup after improper, inherently dangerous, methods of removing lead-based paint are not. In this article we report a case of childhood lead poisoning and document the costs of decontamination after uncontained power sanding was used to remove paint down to bare wood from approximately 3,000 ft^2 of exterior siding on a large, well-maintained 75-year-old house in a middle-income neighborhood. After the uncontrolled removal of lead-based paint, interior dust lead levels ranged from 390 to 27,600 µg Pb/ft^2 (on floors and windowsills) and bare soil lead levels ranged from 360 ppm in the yard to 3,900 ppm along the foundation to 130,000 ppm in the child's play area, well above applicable U.S. Department of Housing and Urban Development/U.S. Environmental Protection Agency standards. The hard costs of decontamination were over $195,000, which greatly exceeds the incremental cost of incorporating lead-safe work practices into repainting. This case report highlights the need to incorporate lead-safe work practices into routine repainting, remodeling, and other renovation and maintenance jobs that may disturb lead-based paint. *Key words:* **childhood lead poisoning, housing, lead, lead-based paint.** *Environ Health Perspect* **111:185–186 (2003). [Online 15 January 2002]**
doi:10.1289/ehp.5761 available via *http://dx.doi.org/*

Although the costs of lead-based paint hazard control in housing are well documented (President's Task Force 2000), the costs of cleanup after improper, inherently dangerous, methods are not. In this article we report the costs of decontamination after uncontained power sanding, which was used to remove paint down to bare wood from approximately 3,000 ft^2 of exterior siding on a large, 75-year-old house in a middle-income neighborhood. The costs of decontamination greatly exceed the cost of lead-safe work practices.

Power sanding to remove lead-based paint is now prohibited in federally assisted housing [U.S. Department of Housing and Urban Development (HUD) 1999a] and in many state and local jurisdictions. However, residential painting and home improvement trades continue to use it as a fast, effective paint removal technique despite worker-protection laws [U.S. Occupational Safety and Health Administration (OHSA) 1994] and severe lead poisoning associated with such methods (McElvaine et al. 1992; Marino et al. 1990; Rabinowitz et al. 1985; Shannon and Graef 1992).

In the case presented here, a family hired a professional painting contractor. The house was built in 1925 and has been continuously occupied by members of the same middle-class family since 1940. The home has been well-maintained both inside and out; no housing or health code violations have ever been issued. The lead content of the paint was not determined before the work began. The crew power sanded the exterior painted surface over a 6-week period without using containment or local exhaust systems. Doors and windows remained open for electrical connections, workmen used the restroom, and attic vents were open, allowing paint dust to contaminate the interior.

Near the completion of sanding, the family pet, a 5-year-old mixed Labrador retriever, died with a blood lead level of 177 µg/dL. The homeowners had the paint tested and informed the contractor of the presence of lead-based paint, but the crew continued to sand for several more days. The family's three children, 1, 2, and 4 years of age, were screened and immediately hospitalized, based on an initial finger stick test. Subsequent confirmatory venipuncture blood lead levels were 23, 19, and 22 µg PbB/dL, respectively, for the three children. The original contractor abandoned the job, and the homeowners hired a replacement painter to complete the job in a lead-safe manner.

The concentration of lead in the paint on the exterior power-sanded surface averaged 130,000 ppm (Mielke et al. 2001). The federal definition of lead-based paint in housing is 5,000 ppm (Residential Lead-Based Paint Hazard Reduction Act 1992). Interior dust wipe samples ranged from 390 to 27,600 µg Pb /ft^2, exceeding all current HUD/U.S. Environmental Protection Agency (EPA) standards, which are 40 µg/ft^2 and 250 µg/ft^2, respectively for floor and windowsills (U.S. EPA 2001). Outside soil lead ranged from 360 ppm in the yard to 3,900 ppm along the foundation, with a layer of 130,000 ppm lead next to the children's playhouse where dust-laden, canvas, drop cloths were shaken (the current federal bare soil standard is 400 ppm in play areas and 1,200 ppm in other yard areas) (U.S. EPA 2001).

The homeowners did most of the cleanup work themselves, using savings for out-of-pocket expenses. Table 1 lists the costs borne by the homeowner. Although the painter's insurance company initially gave assurances that "coverage is afforded," it later refused to process the claim. The matter is being litigated, adding further stress and expense. The homeowners repeated tedious rounds of HEPA vacuuming and three-bucket mopping (Livingston 1997). A drawback of fastidious washing was damage to furniture, artwork, draperies, and "soft items." Some surfaces simply could not be visibly cleaned. The mattresses and bedding, draperies, blinds, toys, clothing, and window air conditioners were all discarded. Repeated wipe samples indicated that the woodwork and floors were porous and harbored lead dust. After thorough, repeated cleaning, the woodwork and hardwood floors were sealed with polyurethane to lock down the remaining dust, plaster walls were repainted to lock down remaining dust, and a contaminated brick patio with a porous surface was demolished and removed.

A certified lead-based paint inspector conducted paint lead measurements using portable lead-based paint X-ray fluorescence (XRF) analyzers. The XRF readings (n = 122) showed that 33% of the readings were above the federal definition of lead-based paint (≥ 1.0 mg/cm^2) (Residential Lead-Based Paint Hazard Reduction Act 1992). Of 66 XRF wall samples, 35% were positive (≥ 1.0 mg/cm^2); of the 36 XRF wood baseboard and casing samples, 86% were negative (< 1.0 mg/cm^2). All surfaces were identified by the inspector as intact and in excellent condition, and no lead-based paint hazards were identified in the interior in the home.

The homeowner's efforts to decontaminate the interior living space appear successful. The dust lead levels declined to less than the detection limit (3 µg/ft^2) and remain low (Mielke 2001). However, the attic, the yard, the layers of lead-dust next to the playhouse,

Address correspondence to D.E. Jacobs, Office of Healthy Homes and Lead Hazard Control, U.S. Department of Housing and Urban Development, P-3202, 451 Seventh St. SW, Washington, DC 20410 USA. Telephone: (202) 755-4973. Fax: (202) 755-1000. E-mail: david_e._jacobs@hud.gov

Received 7 May 2002; accepted 18 November 2002.

Table 1. Lead contamination cleanup costs borne by homeowner.[a]

Cleanup	Cost	Subtotal
Incurred expenses		
Replacement painter	12,698	12,698
Decontamination		
Cleaning (includes supplies, dry cleaning oriental rugs)	4,330	
Replaced items (includes air conditioners, car seats, bedding)	10,049	
HEPA (vacuums, room air filters)	1,518	
Attic (initial vacuuming, contaminated insulation disposal)	1,670	
Sealing floors with polyurethane	9,741	
Repainting plaster walls, wooden trim, locking down remaining dust	10,846	
Demolishing terra cotta patio	1,500	
Environmental sampling (excludes Xavier University research)	1,259	
Temporary relocation (excludes restaurant meals, additional commute)	1,395	42,308
Medical expenses (includes hospital, labs, prescriptions, physicians)	33,559	33,559
Veterinarian	368	368
Anticipated expenses		
Items to replace		
Discarded contaminated personal effects	32,760	
Demolished contaminated terra cotta patio, fiberglass carport roof	10,500	
Contaminated custom drapes	10,000	
Contaminated attic insulation	3,000	56,260
Cleaning		
Contaminated wooden venetian blinds	3,000	
Contaminated attic (> 3,000 ft^2)	15,000	
Decontamination room, tool sheds	500	18,500
Yard		
Removal soil, pressure wash cement walkways, driveway, garden trim	20,000	
Replace topsoil, grass, plants	12,000	32,000
Total cost		195,693

[a]As of December 2001.

and a room used for decontamination purposes remain to be cleaned.

HUD estimated the mean incremental cost of lead hazard control for privately owned low-income older housing using data from its Lead Hazard Control Grant program, which is now active in over 200 local jurisdictions. Data from that program show that the incremental cost of exterior lead paint stabilization is approximately $1,000 per housing unit in the single-family homes treated under the program (HUD 1999b), far less than the cost of the decontamination described above. Incremental lead hazard control costs include worker training and protection, the cost of site preparation, and cleanup. Clearance testing, which includes dust testing to ensure that the unit can be occupied safely, is estimated to cost an additional $150 per housing unit. Modern lead hazard control techniques have been shown to be effective in reducing children's average blood lead levels by 26% and dust lead levels by 50–88% (Galke et al. 2001).

The original painter was hired at $15,600. Because lead-safe work practices were not used, the family experienced an additional $195,693 in hard costs. This does not include the intangible costs of the homeowner's labor, loss in market value of the home, decreased lifetime earnings for the affected children, future medical care and special education, emotional distress, litigation, and payments of $13,866 to the original painter. A replacement painter who used lead-safe work practices was retained for an additional cost of $12,698 to safely complete the remainder of the painting work.

This case was reported in the local press (Pope 1999). The homeowner joined with other parents, public health advocates, housing officials, environmental agencies of the city and state, scientists, and interested citizens in a successful campaign to enact a new local law banning the use of improper, inherently dangerous methods to remove old paint (New Orleans Code 2001).

This case report highlights the need to incorporate lead-safe work practices into routine repainting, remodeling, and other renovation and maintenance jobs that may disturb lead-based paint. This case also points to the need for local laws to prohibit unsafe work practices such as power sanding, abrasive blasting, and open flame burning in residential areas to protect families—particularly children—and their environment, avoid the unnecessary expense associated with decontamination, and keep contractors accountable.

References

Galke W, Clark S, Wilson J, Jacobs D, Succop P, Dixon S, et al. 2001. Evaluation of the HUD lead hazard control grant program: early overall findings. Environ Res 86:149–156.

HUD. 1999a. Requirements for Notification, Evaluation and Reduction of Lead-Based Paint Hazards in Federally Owned Residential Property and Housing Receiving Federal Assistance; Final Rule. Fed Reg 64(178):50139–50231.

———. 1999b. Economic Analysis of the Final Rule on Lead-Based Paint. Washington DC:U.S. Department of Housing and Urban Development.

Livingston D. 1997. Maintaining a Lead Safe Home. Baltimore, MD:Dennis Livingston Community Resources.

Marino PE, Landrigan PJ, Graef J, Nussbaum A, Bayan G, Boch K, et al. 1990. A case report of lead paint poisoning during renovation of a Victorian farmhouse. Am J Public Health 80(10):1183–1185.

McElvaine MD, DeUngria EG, Matte TD, Copley CG, Binder S. 1992. Prevalence of radiographic evidence of paint chip ingestion among children with moderate to severe lead poisoning, St. Louis, Missouri, 1989–90. Pediatrics 89:740–742.

Mielke HW, Powell E, Shah A, Gonzales C, Mielke PW. 2001. Multiple metal contamination from old house paints: consequences of power sanding and paint scraping in New Orleans. Environ Health Perspect 109:973–978.

New Orleans Code. 2001. Lead Paint Poisoning. Article 8, Sections 82-311–82-321 of Ordinance No. 4264 MCS. New Orleans, LA:City of New Orleans.

Occupational Safety and Health Administration (OSHA). 1994. Safety and Health Regulations for Construction. Lead. 29CFR1926.62.

Pope J. 1999. New Orleans considers ban on sanding houses. Times Picayune (New Orleans, LA) 17 February: A1.

President's Task Force on Environmental Health Risks and Safety Risks to Children. 2000. Eliminating Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards (Report and Appendix). Washington DC:U.S. Department of Housing and Urban Development and U.S. Environmental Protection Agency.

Rabinowitz M, Leviton A, Bellinger D. 1985. Home refinishing: lead paint and infant blood lead levels. Am J Public Health 75(4):403–404.

Residential Lead-Based Paint Hazard Reduction Act. 1992. Title X of the Housing and Community Development Act. Public Law 102-550.

Shannon MW, Graef JW. 1992. Lead intoxication in infancy. Pediatrics 89(1):87–90.

U.S. EPA. 2001. Identification of Dangerous Levels of Lead; Final Rule, 40CFR745. Fed Reg 66(4):1206–1240.