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REGULATORY STUDIES PROGRAM

Public Interest Comment on
The Environmental Protection Agency's Proposed Rule for Lead; Renovation, Repair, and Painting Program[1]

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The Regulatory Studies Program (RSP) of the Mercatus Center at George Mason University is dedicated to advancing knowledge of the impact of regulation on society. As part of its mission, RSP conducts careful and independent analyses employing contemporary economic scholarship to assess rulemaking proposals from the perspective of the public interest. Thus, this comment on the Environmental Protection Agency's proposed Lead; Renovation, Repair, and Painting Program does not represent the views of any particular affected party or special interest group, but is designed to evaluate the effect of the Agency's proposal on overall consumer welfare.

I. Introduction/Summary of the Rule

Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 amended the Toxic Substances Control Act (TSCA) to require regulation of lead-based paint hazards in residential renovation and remodeling. The new section 402(c)(3) of TSCA directed EPA to promulgate regulations to ensure that individuals engaged in renovation and remodeling activities that create lead-based paint hazards are properly trained, that the training programs are accredited, and that contractors engaged in such activities are certified.[2]

This statutory language unambiguously directs EPA to require training and certification for individuals who engage in renovation, remodeling, and painting (RRP)[3] activities that

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[2] Codified at 15 U.S.C. § 2682.

[3] There might be some confusion concerning the terminology applied to the scope of the statute and rule. Section 402(c)(3) talks of its application to "regulations to renovation and remodeling activities." Studies produced either for or by EPA, which examined the relationship between renovation and

create lead-based paint hazards. However, in developing those regulations, it is important for EPA to recognize that renovation and remodeling *reduce* lead-based paint hazards by removing or stabilizing lead-based paint even as they create hazards by producing dust. In its ranking of risks from lead exposure, the National Safety Council listed deferred maintenance and deteriorating paint—both problems RRP activities would remove—as the most serious and persistent causes of elevated blood-lead in children.[4] Lead-based paint hazards often result from either the ingestion of lead paint chips or prolonged exposure to lead contaminated dust created by deteriorating paint.[5] Renovation and remodeling practices that remove these hazards reduce exposure and health risks. Thus, in promulgating regulations under the statute, EPA faces a difficult balancing act. If RRP activities are, on net, beneficial, it must be careful not to introduce requirements that would inhibit this risk-reducing activity. It must weigh the risk that RRP activities create lead-based paint hazards by producing dust during the renovation, against the risk that constraining RRP activities (including by raising their costs) will lead to greater exposure to deteriorating paint, its chips and dust by leaving lead-based paint in place. For this regulation to result in net reductions in health effects from lead exposure, EPA must be sure that it reduces the risks introduced by RRP to a greater extent than it increases risks caused by lack of RRP.

This comment attempts to analyze how well the proposal achieves the appropriate balance. The remainder of this section summarizes EPA's proposed rule. Section II provides a history of lead and lead paint. Section III addresses the research exploring the potential links between RRP work, lead dust, and elevated blood-lead levels in both RRP workers and children. Section IV examines the renovation and remodeling industry, consumers of professional services, and what the proposed rules mean for both. Section V summarizes the likely impacts of the proposed regulations, while section VI offers recommendations as to how EPA can maximize benefits, minimize costs, and still comply with the statutory mandates.

A. Summary of EPA's proposal

EPA proposes to establish requirements for

- training renovators and dust sampling technicians;
- certifying renovators, dust sampling technicians, and renovation firms;

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remodeling and blood-lead, often abbreviate renovation and remodeling as R&R. In fact, a particular section of studies is collectively known as the "R&R Study." The proposed rule, however, speaks of renovation, repair, and painting, which is the form also adopted by EPA's Economic Analysis and abbreviated as RRP. For the sake of simplicity, it should be assumed that R&R and RRP refer to the same activities, as painting is included within "R&R work" in the earlier EPA studies. Although the two terms maybe used interchangeably, this comment uses "RRP" whenever possible to be consistent with EPA's proposal.

[4] Al Heavens, On the House: New rules posted for lead-paint removal, The Philadelphia Enquirer, Jan. 15, 2006.

[5] American Academy of Pediatrics, Lead Exposure in Children: Prevention, Detection, and Management, 116 PEDIATRICS 1036, 1036-37 (Oct. 2005) [hereinafter AAP].

- accrediting providers of renovation and dust sampling technician training; and
- renovation work practices.[6]

These requirements would apply in ''target housing,'' defined in section 401 of the Toxic Substances Control Act (TSCA) as any housing constructed before 1978, except housing for the elderly or persons with disabilities (unless any child under age 6 resides or is expected to reside in such housing) or any 0-bedroom dwelling.[7]

EPA proposes to implement the requirements in two phases. In the first year, "the rule would apply to all renovations for compensation performed in target housing where a child with an increased blood lead level resides, rental target housing built before 1960, and owner-occupied target housing built before 1960, unless, with respect to owner-occupied target housing, the person performing the renovation obtains a statement signed by the owner-occupant that the renovation will occur in the owner's residence and that no child under age 6 resides there."[8]

In the second phase, the proposal would apply to "all rental target housing and owner-occupied target housing built in the years 1960 through 1977 where a child under age 6 resides."[9]

The scope of the proposed regulation is quite broad. The many RRP firms brought within this broad scope are required to comply with a wide range of very specific, and potentially costly, measures. At the beginning of the process, firms must pay a yet to be determined certification fee.[10] Workers must then complete a training course offered by an EPA-accredited training provider. The courses must be a minimum of eight hours long with at least two hours devoted to hands-on training.[11] Once certified, a worker must take a refresher course every three years. Failure to do so triggers a requirement to retake the initial training course.[12]

All persons on the job either have to be a certified renovator or trained by a certified renovator. They must also carry copies of their initial course completion certificate and most recent refresher course completion certificate.[13] In addition to training requirements, workers must also engage in specific work practices including:

- The posting of signs defining the work area.
- Isolating the work area so that no visible dust or debris can leave.[14]

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[6] Lead; Renovation Repair, and Painting Program, 71 Fed. Reg. 1588 (proposed January 10, 2006) (to be codified at 40 C.F.R. pt. 745).
[7] 71 FR 1588
[8] *Id.*
[9] *Id.*
[10] ENVIRONMENTAL PROTECTION AGENCY PRESENTATION, LEAD-BASED PAINT RENOVATION, REPAIR, AND PAINTING: OVERVIEW OF PROPOSED RULE 8 (Mar. 2006).
[11] *Id*. at 12.
[12] *Id*. at 10.
[13] *Id.* at 14-16.
[14] *Id.* at 17.

- Remove or cover all objects from the work area.
- Close and cover all ducts in the work area.
- Close or cover all windows and doors in the work area.
- Cover the floor surface of the work area with plastic sheeting.
- Ensure that all personnel, tools, and other items including waste are free of dust and debris when leaving the work area.[15]
- Close all doors and windows within 20 feet of the renovation.
- Cover the ground with plastic sheeting extending out from the edge of the structure a sufficient distance to collect falling paint debris.[16]
- After the renovation has been completed, the firm must clean the work area until no visible dust, debris or residue remains.[17]
- Pick up all paint chips and debris.
- Remove all protective sheeting.[18]
- Clean all objects and surfaces in and around the work area. This includes the mopping of all uncarpeted floors, the cleaning of all surfaces, objects, and walls, including furniture and fixtures, with a damp cloth and a HEPA vacuum.[19]

After certification has been achieved, and the prescribed work practices adhered to, the work area must pass a cleaning test, which involves the comparison of a damp cloth to a Cleaning Verification Card developed by EPA. The cleaning test consists of a properly trained and certified worker wiping down all windowsills and floors. After the damp cloth has either been run over a windowsill or $40ft^2$ of floor in the prescribed manner, it is compared to the Cleaning Verification Card. If the windowsill or floor fails the test, then the cleaning steps involving the combination damp cloth and HEPA vacuum are repeated, until the test is passed.[20]

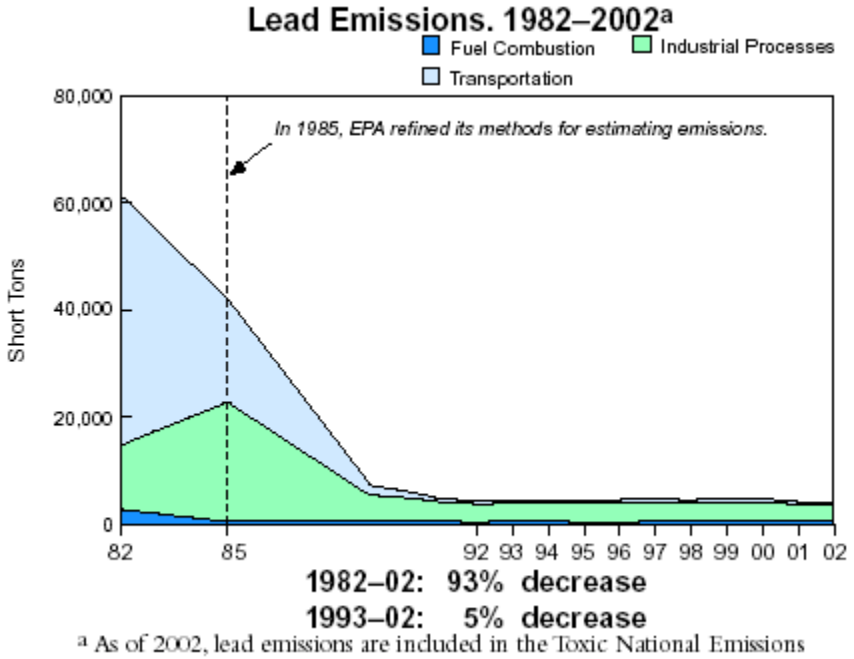
II. The History of Lead, Lead Paint, and "Elevated" Blood-Lead Levels

Lead is a soft, naturally occurring element, the use of which is as old as civilization itself. Its periodic symbol Pb is derived from the Latin *plumbum* and reflects its widespread use in the water and sewage pipes of the Roman Empire. From ancient water pipes to Revolutionary War musket balls to modern gasoline additive, lead has been adapted to numerous useful purposes, but, over the past few decades a rising tide of health concerns have dramatically circumscribed the element's use.[21]

While ambient lead concentrations in the industrialized world have been falling for the last century, the drop in the last thirty years has been dramatic. For example, due to its remarkable ability to reduce engine knock and boost octane, lead had long been used as a

[15] *Id.* at 18.
[16] *Id.* at 19.
[17] *Id.* at 20.
[18] *Id.* at 21.
[19] *Id.* at 22.
[20] *Id.* at 23-25.
[21] *See* Encyclopedia Britannica, Lead, (Online ed. 2006), *available at* http://www.britannica.com/eb/article-4107.

gasoline additive. Lead may have improved engines' performance, but by 1970 the nation's tailpipes were the dominant contributor to the 220,869 tons of lead emitted into the air that year. The effort to gradually phase out the use of leaded gasoline was the driving force behind the reduction of emissions to 4,975 tons in 1990. The final removal of all lead from gasoline by the deadline of January 31, 1995 left just 2,627 tons in annual emissions in 1996.[22] Most of what remained could be attributed to lead smelters and battery recycling plants, which had themselves released 28,600 tons in 1970 and whose emissions had fallen nearly 90 percent to 2,900 tons by 1994.[23] In all, EPA estimates (even with some admitted double counting)[24] that ambient lead concentrations fell 94 percent between 1983 and 2002.[25] In fact, ambient lead levels are now so low that EPA has proposed shutting down most of its lead monitors.[26] An illustration of the decline in lead emissions from various sources can be found on EPA's website and is reproduced on the following page.[27]



[a] As of 2002, lead emissions are included in the Toxic National Emissions Inventory.

[22] BUREAU OF THE CENSUS, ECONOMICS AND STATISTICS ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE, STATISTICAL ABSTRACT OF THE UNITED STATES, Table 360 (2005).

[23] GOVERNMENT PRINTING OFFICE, ECONOMIC REPORT OF THE PRESIDENT 139 (Feb. 1996), *available at* http://www.gpoaccess.gov/usbudget/fy97/pdf/erp.pdf.

[24] EPA believes some double counting occurs because of overestimates of the amount of lead picked up from gasoline by motor oil used in engines. These emissions are then counted again, when the waste oil is itself consumed in an industrial process, like when it is used to fire cement kilns. *See* ENVIRONMENTAL PROTECTION AGENCY, MORE DETAILS ON LEAD – BASED ON DATA THROUGH 2002, *available at* http://www.epa.gov/airtrends/lead2.html.

[25] *Id.*

[26] Revisions to Ambient Air Monitoring Regulations, 71 Fed. Reg. 2710 (proposed January 17, 2006) (to be codified at 40 C.F.R. pts. 53 and 58).

[27] ENVIRONMENTAL PROTECTION AGENCY, AIR TRENDS, LEAD, *available at* http://www.epa.gov/oar/airtrends/lead.html.

The federal lead effort has been substantial, but EPA has not been the only actor striving to limit the public's exposure to lead. In 1972, the Society for Testing and Materials, a trade group, issued restrictions on the use of lead in pewter, which removed lead from eating utensils. At about the same time, the introduction of plastic and other materials, brought about by economic factors, led to the elimination of the minute traces of lead still remaining in "tin" cans.[28] Lead also fell out of favor with plumbers, who found that new plastic and copper pipes were sturdier, more economical, and easier to install. In 1986, EPA banned the use of plumbing solder containing lead; by that time lead solder had long since fallen out of use and what remained on the market contained only minute traces of lead.[29] As a result of the combination of government regulations, private action, and market forces, our current physical interaction with lead is now almost non-existent.

A. Lead Paint

Despite the removal of so much lead from our lives, there is a lingering problem in the form of lead paint. White lead is one of the oldest pigments known and has been used in painting for centuries. By the first part of the twentieth century, lead was used less for its qualities as a pigment than for its many additional attributes—it hastened drying and kept out moisture and lead paint stayed cleaner and lasted longer than paints without lead.[30] Unfortunately, as was the case with its ability to boost gasoline octane and reduce engine knock, lead's contribution to home décor eventually presented an unforeseen toxicological problem. Reacting to public health concerns, the paint industry began voluntarily reducing the amount of lead in paint in the 1940s,[31] and in 1955, adopted a standard limiting the amount of lead in paint to one percent by weight. By 1960, the amount of lead in paint had declined, and lead-free paints were widely available, while the availability of lead paint declined to nearly nothing prior to its formal banning in 1978.[32]

B. "Elevated" Blood-Lead Levels

The dramatic reduction of lead in the environment is evident in measures of human exposure. In 1977, a study in San Francisco, an older city with widespread lead problems, 50 percent of children tested had blood lead levels of 20μg/dL or more. A repeat of the study in 1991 with a similar sampling of area children found that 50 percent had become 1.7 percent—a 30-fold decrease. Studies confirmed similar results in Oakland, Los Angeles, and Sacramento.[33]

As the amount of lead in the environment has declined rapidly, so has the government's definition of what constitutes a blood lead "level of concern." In 1970, the "level of

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[28] CASSANDRA CHRONES MOORE, HAUNTED HOUSING: HOW TOXIC SCARE STORIES ARE SPOOKING THE PUBLIC OUT OF HOUSE AND HOME 84-85, (Cato Inst. 1997) [hereinafter MOORE].
[29] *Id.*
[30] *See* Encyclopedia Britannica, Lead, (Online ed. 2006), *available at* http://www.britannica.com/eb/article-4107.
[31] Ellen Ruppel Shell, *An Element of Doubt*, THE ATLANTIC MONTHLY, Dec. 1995, at 24.
[32] MOORE, *supra* note 28, at 86-87.
[33] *Id*. at 84.

concern" was set by the Centers for Disease Control at 60µg/dL,[34] or about the concentration at which acute physical symptoms of lead poisoning set in. In the 1980s, CDC lowered the level of concern to 25µg/dL—the level at which lead begins to inhibit the formation of heme (the molecules that carry oxygen) in the bloodstream.[35] Although physical or biochemical effects are unobservable under 25µg/dL, CDC further lowered the level of concern to 10µg/dL in 1991. Not surprisingly, these reductions had a considerable impact on the number of "at risk children," increasing the group labeled "at risk" by definitional changes even as blood-lead levels in children fell dramatically. For example, the 1991 change increased the number of at risk children from 400,000 to 4.5 million.[36] Despite the frequent reductions in the "level of concern" threshold, the number of "at risk" children has fallen almost as fast as their class is re-certified. An article published in the May 27, 2005 issue of *Morbidity and Mortality Weekly* estimates that there were 310,000 children with "elevated" (≥ 10µg/dL) blood-lead levels in 1999-2002,[37] which represents a 93 percent decline from 1991's 4.5 million.[38]

III. Renovations, Lead Dust, and Blood-Lead

It is well established that the direct ingestion of lead paint chips and/or prolonged exposure to deteriorating lead paint can elevate blood-lead levels. However, the connection between concentrations of dust contaminated by lead paint and elevated blood-lead levels is not as well understood. It appears simply to have been assumed that if persons engaged in activities that produced significant amounts of lead contaminated dust and failed to take adequate precautions, then the lead dust would manifest itself in the form of elevated blood-lead levels. This deduction seemed logical, considering the aforementioned known connection between dust atomizing from slowly deteriorating lead paint and elevated blood-lead levels. The results of several studies of dust exposure from RRP work suggest that the relationship is not as straightforward.

A. Renovation & Remodeling Workers, Lead Dust, and Blood-Lead Levels

To understand the links between lead dust produced by RRP activities and elevated blood-lead levels, EPA launched a series of studies in 1993, collectively known as the R&R (Renovation and Remodeling) study. The R&R study was conducted in phases. The first two phases were the Environmental Field Sampling Study (EFSS or Phase I) and the Worker Characterization and Blood-Lead Study (WCBS or Phase II). The results of Phases I and II are summarized in the executive summary presented at the beginning of Phase III, which is also known as the Wisconsin Childhood Blood-Lead Study:

[34] *Id.* at 80.
[35] For a discussion of the physical and microbiological effects of lead on the body and blood *see* AAP, *supra* note 5, at 1038-39.
[36] MOORE, at 106.
[37] *Blood-Lead Levels – United States, 1999-2002*, 54 MORBIDITY AND MORTALITY WEEKLY REPORT 9-12 (May 27, 2005).
[38] MOORE, at 106.

> In general, the results of Phases I and II indicated that, for some R&R activities, airborne lead levels within workers' breathing zones often exceeded the Occupational Safety and Health Administration's permissible exposure limit, but the blood-lead concentrations of workers that regularly engage in these activities were not likely to be elevated (≥10µg/dL).[39]

While the OSHA Permissible Exposure Limit (PEL) of lead dust is 50µg/m³, the renovation and remodeling workers involved in the study were typically exposed to concentrations of more than 100µg/m³ when conducting paint removal, interior demolition, and sawing activities. Other activities, such as interior surface preparation, and central heating system maintenance or repair, usually produced concentrations of more then 49µg/m³. Battelle, which conducted the study under contract to EPA, asked the workers to perform as they would in an "unregulated environment," which resulted in workers employing methods that generated considerable dust, while the workers took minimal precautions.[40] Furthermore, the dust created was almost certain to contain lead, as the study sought out some of the highest risk renovation workers in the country.[41]

Despite the high levels of the lead dust in the air, only one out of 581 workers had a blood-lead concentration greater than 40µg/dL.[42] In fact, blood-lead concentrations exceeded 25µg/dL in only 7 workers (1.2%) and exceeded 10µg/dL in only 50 workers (8.8%). Thus, the first two phases of the R&R study show little evidence of elevated blood-lead concentrations in workers, despite the potential for high airborne lead levels within workers' breathing zones from performing RRP activities.[43] Although the study found high concentrations of lead dust and that workers often did not take precautions, such as wearing respirators,[44] the numbers forced the study to conclude:

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[39] ENVIRONMENTAL PROTECTION AGENCY, LEAD EXPOSURE ASSOCIATED WITH RENOVATION AND REMODELING ACTIVITIES: PHASE III, WISCONSIN CHILDHOOD BLOOD-LEAD STUDY vii (Prepared by Battelle Mar. 1999) (emphasis added) [hereinafter WISCONSIN STUDY].

[40] "Professional abatement workers in the EFSS did wear respirators and follow abatement personal hygiene procedures to protect themselves. However, they did not follow standard abatement procedures, such as the use of wet methods, and were instructed to perform the tasks as they are typically conducted in an unregulated environment. For example, demolition was conducted dry with hammers and crow bars, and sawing was conducted dry with a circular saw and no HEPA attachment. Since no dust minimization procedures were used, the work was considered representative of typical renovation and remodeling work. On the other hand, available data sources from professional abatement work that did involve dust minimization were not included in any data summaries." ENVIRONMENTAL PROTECTION AGENCY, LEAD EXPOSURE ASSOCIATED WITH RENOVATION AND REMODELING ACTIVITIES: SUMMARY REPORT 4 (prepared by Battelle May 1997) [hereinafter PHASES I & II].

[41] "It is possible that specialized groups of R&R workers exist who may be more highly exposed, for example, workers specializing in historic renovations. However, the R&R study included workers in cities with documented lead problems who were conducting a significant amount of work in older buildings. In this regard, study results were weighted toward highly exposed general R&R workers." PHASES I & II, at 6.

[42] The highest reported case was 55µg/dL, which appears to have been a bit of an anomaly, as the second highest case was about 33µg/dL. *Id.* at 30.

[43] *Id.* at vii-viii.

[44] A survey of 585 union carpenters who worked for independent R&R contractors found that: 90 percent of workers did not use a respirator; 90 percent did not use lead abatement cleanup methods, although 99

> The results of this study indicate that R&R workers may be exposed to high levels of environmental lead while conducting certain activities in certain environments. However, there is little evidence of elevated blood-lead concentrations in a population of R&R workers who conduct a wide variety of activities.[45]
>
> The results indicate that even frequent conduct of these activities would be unlikely to raise worker blood-lead concentrations to a level that is currently considered a health risk.[46]
>
> It was originally hoped that the combination of environmental measurements and worker blood-lead concentrations could provide sufficient exposure information to address regulatory needs. However, the blood-lead concentrations of R&R workers were very low, while the amount of lead distributed in the environment was very high. These conflicting outcomes imply that environmental lead may be an inadequate surrogate for measuring worker blood-lead concentration.[47]

Phases I and II of the R&R study may have failed to find a connection between elevated blood-lead levels and workers' exposure to considerable amounts of lead-contaminated dust, but they do provide other useful information on the creation of lead dust during RRP activities and suggest appropriate means of dealing with it. For example, the studies identified which RRP activities generated the most dust and how they deposited it.

> Paint removal, demolition, sawing, and disturbing central heating system ductwork were more likely to cause airborne lead to scatter and settle over a widespread area, while window replacement and drilling confined the disturbed lead to a smaller area.[48]
>
> Average levels were considerably lower (<20 $\mu g/m^3$) for drilling, carpet removal, window replacement, and exterior surface preparation.[49]

The studies collected dust measurements before cleanup,[50] and discovered that dust concentrations remained high close to the area worked on but diminished rapidly after only a few feet. Table 1 lists RRP activities followed by dust concentrations in

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percent did use broom cleanup; 97 percent used dry paint removal methods; 67 percent had not received any materials on lead hazards, and 87 percent had received no lead exposure training. *Id.* at 7.

[45] *Id.* at 6. "Paint removal, window replacement, and interior demolition were associated with a statistically significant increase in workers blood-lead concentrations. Significance was determined at the 0.05 level, meaning that the probability that the increases were only due to change was no higher than 0.05. However, the estimated increase was so small that it is not meaningful from a practical standpoint." *Id.* at 6-7.

[46] *Id.* at 22.

[47] *Id.* at 16.

[48] *Id.* at 8.

[49] *Id.* at 6.

[50] *Id.* at 17.

micrograms per square foot. The first number is the dust concentration at the location of the work done, while the second number represents dust levels six feet away.[51]

TABLE 1

RRP Activity	Dust Concentrations in micrograms per square foot ($\mu g/ft^2$) At the location	6 feet away
Window replacement	7,710.00	482.00
Paint removal	42,900.00	15,500.00
HVAC work	1,290.00	414.00
Large structure removal (interior demolition)	3,250.00	1,530.00
Drilling into wood	432.00	1.27.00
Drilling into plaster	34.50	0.04
Sawing into wood	999.00	105.00
Sawing into plaster	328.00	10.60

Despite the high levels of dust created, the R&R study found not only that dust concentrations remained localized, but also that "simple broom and shop-vacuum cleanup resulted in substantial reduction in the total amount of lead available to occupants."[52] Table 2 lists RRP activities followed by the amount of dust created at the place of work, followed by the method of cleanup (broom or ordinary shop vacuum), followed by the amount of dust present after cleanup and the percentage reduction in dust.[53]

TABLE 2

RRP Activity	Initial Dust Concentration ($\mu g/ft^{2)}$	Method of Cleanup	Dust Concentration After Cleanup ($\mu g/ft^2$)	Percent Reduction
Drilling	26,700	broom	166	99.4%
Drilling	73,500	shop vacuum	360	99.5%
Abrasive Sanding	653,000	broom	1,070	99.8%
Abrasive Sanding	203,000	shop vacuum	808	99.6%

The most rudimentary of cleanups produced some impressive results; even more interesting is that workers performed some form of cleanup almost every single day. Workers in the study spent an average of 17 days in the previous month performing general RRP work and 11 of those days in pre-1950 dwellings. Of the activities conducted during work, cleanup was the most frequent, occurring on 11 days, followed by large structure removal (7 days), paint removal (6 days), door replacement (4 days),

[51] *Id.* at 23.
[52] *Id.* at 8.
[53] *Id.* at 25.

carpet removal (2 days), and HVAC (heating vents) work (1 day).[54] These numbers imply that professional RRP workers conduct some sort of cleanup nearly every day, so that even the large amounts of dust generated by many RRP activities are unlikely to persist for long. This, along with the failure to find a link between lead-contaminated dust and elevated blood-lead levels, led Battelle to hint that certification requirements might be more suited to those working in environments characterized by long-term exposure to dust rather than those working in environments characterized by the short term spikes triggered by some RRP activities.[55]

Through Phases I and II of the R&R study, EPA had hoped that "the combination of environmental measurements and worker blood-lead concentrations could provide sufficient exposure information to address regulatory needs."[56] While Phases I and II may not have succeeded in that ambitious objective, they still provide useful information with which to address regulatory needs. The studies documented many characteristics of dust produced during RRP work, and demonstrated how workers can address lead dust issues effectively with a few simple precautions and practices, without resorting to a lengthier certification process and long lists of prescribed work practices. The information developed in Phases I and II, if applied to the proposed rule, could lessen its burden on RRP workers and the general public without sacrificing benefits:

1. Some RRP activities, such as drilling, carpet, removal, window, replacement, and exterior surface preparation generated very little in the way of dust ($<20\ \mu g/m^3$),[57] even though they surpass EPA threshold if disturbing more than $2ft^2$ of painted surface.[58] As these activities do not appear to generate dust, EPA should consider exempting these activities entirely, or exempting the persons conducting them from training and certification requirements, rather than imposing the same costly procedures as for higher risk activities.

2. Most dust created during RRP activities is found close to the actual activity. At six feet away from the activity dust concentrations had fallen 94 percent for window replacement, 68 percent for HVAC, and 99.81 percent for drilling into wood. Even large structure removal (interior demolition)—the most prolific spreader of dust—saw its dust concentrations drop by 53 percent within six feet. RRP activities often create considerable dust but these concentrations appear to be limited to the immediate vicinity of the work area.[59] EPA certification requirements could achieve a great deal by simply informing workers of this fact, encouraging workers to clean up more thoroughly closer to work locations, and informing homeowners to keep their children out of work areas prior to cleanup.

[54] *Id.* at 27.
[55] "Because low blood-lead concentrations were observed among R&R workers, long-term occupant exposure should be stressed when determining the need for worker training, certification or educational materials." *Id.* at 6.
[56] *Id.* at 16.
[57] *See Id.* at 6.
[58] 71 FR 1593.
[59] *Id.* at 23.

Furthermore, since dust does not appear to travel more than a few feet, the sealing of work areas and the laying of hundreds of square feet of plastic sheeting may be less cost-effective than simpler methods focused on the immediate area.

3. The most rudimentary of cleanups achieved massive reductions in the amount of dust. Whether they used a broom or an ordinary shop vacuum, workers managed to reduce lead dust concentrations by over 99 percent. Workers achieved these results without extensive plastic sheeting or expensive HEPA vacuums and filters.[60] Although EPA is under a statutory obligation to create certification and training programs for renovation and remodeling workers,[61] the Phase I and II studies suggest that extensive training and a lengthy certification process may not be required to limit dust levels. The intent of the statute can be met with a short, simple training session, emphasizing which activities create the most dust, where they deposit that dust, and the value and best methods of a thorough cleanup.

4. Most importantly, significant concentrations of lead-contaminated dust do not appear to elevate blood-lead levels in RRP workers, nor impose other adverse health effects, evidence that RRP work does not create a "lead-based paint hazard" (as mentioned in the statute) for RRP workers. A logical interpretation of this result may be that training and certification for RRP workers need not include extensive training or information concerning the threat of lead-contaminated dust to workers. Rational training and certification programs might contain a reminder to wear a mask and stress the importance of frequent cleanup, but the facts do not appear to warrant more extensive measures.

Phases I and II of the R&R study reveal that lead-contaminated dust is not the grave threat we thought it was, and this is good news. RRP workers now need not worry about elevated blood-levels caused by exposure to lead-contaminated dust. Moreover, these findings allow EPA a factual foundation on which to craft simple, low cost, and highly effective certification and training requirements for RRP workers. To ensure that workers engaged in RRP activities are properly trained and certified for the purposes of avoiding lead-based paint hazards, EPA need not mandate extensive and expensive training and certification procedures. The statute's requirements can be easily met through the dissemination of information about the characteristics of dust created during renovations and the value of frequent and thorough cleanups. Furthermore, the introduction of a light but effective certification regimen ensures that increases in RRP costs will be kept to a minimum, which will decrease the amount of do-it-yourself substitution, while ensuring that RRP work intended to remedy peeling or deteriorating paint is not impeded. This allows the certification process to be effective without inadvertently doing more harm than good.

[60] *See Id.* at 25.
[61] 15 U.S.C. § 2682.

C. Phase III: The Wisconsin Childhood Blood-Lead Study

Unlike Phases I and II, the Wisconsin Childhood Blood-Lead Study did not involve the measurement of lead dust and subsequent blood-lead levels. Researchers simply took existing blood-lead measurements from the Wisconsin blood-lead registry, called the parents of 3,654 of the children under the age of six on the registry, and asked them questions about any RRP work that had been done in their homes during the past year.

Researchers purposefully excluded children from the city of Milwaukee and Racine County, who experienced a higher incidence of lead poisoning than the whole state. The reason given was that the inclusion of these areas would distort the relationship between RRP activities and blood-lead levels.[62]

The study thus tried to avoid selection bias, which often weakens lead studies.[63] Unfortunately, information from the study indicates that while researchers may have attempted to avoid selection bias by excluding Milwaukee and Racine, they still ended up with a biased sample. As seen in most previous studies, socioeconomic factors have perhaps the strongest effects on blood-lead levels. Race and income definitely influence blood-lead levels.[64] Although the Wisconsin study tried to create an unbiased pool of test subjects by excluding Milwaukee and Racine counties, they ended up with a cohort of test subjects with a higher incidence of elevated blood-lead levels than the national average and one riddled with high percentages of confounders that themselves are intrinsically linked to elevated blood-lead levels and lower IQ. Keeping in mind that race, age, income, housing age, parents' education, etc., are commonly associated with elevated blood levels, the following facts about the 3,650[65] children in the Wisconsin study should be taken into account:

- Eight percent possessed elevated blood-lead levels (≥ 10μg/dL).[66] The national average among 1-5 year olds is less than two percent.[67]
- Only 67 percent of children participating in the study were Caucasian. Outside of Milwaukee and Racine counties, the population of Wisconsin is 95 percent Caucasian.[68]

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[62] "[T]hese cities (Milwaukee and Racine) have a higher incidence of lead poisoning compared to the state as a whole. The higher incidence of lead poisoning may be a result of a greater density of older, deteriorating housing, which would make it more difficult to isolate the effect of lead exposure from renovation activities on the children." WISCONSIN STUDY, *supra* note 39, at 5 (parenthesis added).

[63] S.J. Pocock, M. Smith & P. Baghurst, *Environmental Lead and Children's Intelligence: A Systematic Review of the Epidemiological Evidence*, BMJ, 309, 1189-1197 (1994).

[64] *Id.*

[65] The study sometimes uses the figure of 3,650 and 3,654. The use of 3,650 is likely representative of the fact that blood-lead levels of four children were later thrown out after it was discovered that their elevated blood-lead levels had been the result of a combination of the collection of samples through the capillary technique with skin contamination. *See* WISCONSIN STUDY, *supra* note 39, at 13.

[66] *Id*. at 14-16.

[67] THE FEDERAL INTERAGENCY FORUM ON CHILD AND FAMILY STATISTICS, AMERICA'S CHILDREN: KEY NATIONAL INDICATORS OF CHILDREN'S WELL-BEING 2005, *available* at http://www.childstats.gov/americaschildren/.

- 57 percent of came from households making less than $30,000 a year.
- 37 percent of children were known to be on medical assistance.
- 75 percent lived in residences built prior to 1978.
- 22 percent had lived in their residences less than a year.
- 59 percent were aged two years or younger with 44 percent being aged one or younger.
- Less than four percent lived in houses with "a lot of peeling paint" inside.
- Less than eight percent lived in residences with "a lot of peeling paint" outside.
- 31 percent of study children may have been exposed to lead as a result of the occupation of a household member
- 43 percent may have been exposed to lead as a result of a hobby of a household member
- Most respondents were female— 52 percent had a high school education or less, 33 percent had some education beyond high school, 16 percent were college grads.[69]

The Wisconsin study explicitly excluded Milwaukee and Racine counties to avoid possible selection biases created by sampling from an area with such high concentrations of poor, minority children with elevated blood-lead levels, living in older houses. The researchers thought that the demographics present in Milwaukee and Racine counties "would make it more difficult to isolate the effect of lead exposure from renovation activities on the children."[70] Unfortunately, as the facts listed above indicate, the Wisconsin study ended up with a cohort of children living in conditions that appear similar to those in the counties it purposefully avoided. The concentration of children with elevated blood-lead levels is more than four times the national average. They are overwhelmingly poor, live in older, deteriorating housing, are dependent on state medical assistance, and born to relatively uneducated parents. Although 67 percent are Caucasian, this is far below the state average of 95 percent (excluding Milwaukee and Racine counties). To its credit, the Wisconsin study admits that the 3,650 children it selected from the blood-lead registry might possess higher mean blood-lead levels,[71] have higher participation rates in government medical assistance programs,[72] and be more likely to be minorities.[73]

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[68] WISCONSIN STUDY, at 26.

[69] *Id.* at 14-16.

[70] *Id.* at 5.

[71] "Every child from the Wisconsin blood-lead registry with an elevated blood-lead concentration was a candidate for the study, while only a fraction of the children with blood-lead concentrations <7 µg/dL were included. Thus, geometric mean blood-lead concentrations reported based on this study may be higher than those based on the full registry." *Id.* at 14.

[72] "In Wisconsin, blood-lead screening is mandatory for children receiving medical assistance (Medicaid) and voluntary for others. As a result, the proportion of families receiving medical assistance in the Wisconsin blood-lead registry may be higher than the proportion of such families in the state." *Id.* at 5.

[73] "A comparison of the racial distribution across the state (excluding Milwaukee and Racine counties) to the racial distribution selected for this study revealed that minorities are likely over represented in the registry." *Id.* at 3; "The registry sample had larger percentages of African-Americans, Asians, and Native Americans than percentages reported by the census." (Although 95% of persons outside of

The exclusion of Milwaukee and Racine may have been intended to avoid subjects living in older or deteriorating housing, but figures from the study's appendix indicate that these confounders were not successfully avoided. The following is a breakdown of the age of homes, the number of children, and their corresponding blood-lead levels.[74]

TABLE 3

Blood-Lead Level	Number of Children <7µg/dL	Number of Children 7-10µg/dL	Number of Children ≥10µg/dL
Homes built before 1940	1,048	154	123
Homes built between 1940-49	162	16	13
Homes built between 1950-59	181	25	15
Homes built between 1960-69	179	24	14
Homes built between 1970-79	398	41	21
Homes built after 1980	638	41	29
Home age left blank	393	65	70

Not surprisingly, most of the children with elevated blood-lead levels are found in homes built before 1980, but these figures reveal that many children don't just live in houses built before 1980—they live in homes built before 1940. Once the number of blank entries is removed, the number of children with known home ages is 3,122. Of these, 1,325 lived in houses built before 1940. Roughly half of all children lived in homes built before 1950.

Perhaps the biggest problem with the Wisconsin study is that while its conclusion claims a statistically significant correlation between RRP work and elevated blood levels, there appeared to be no connection between the age of the home and elevated blood levels. That is, according to the Wisconsin study, renovations in homes built after 1980, which are unlikely to contain lead anywhere, are just as likely to increase the risk of elevated blood-lead levels, as renovations performed on older houses.[75]

> For the final set of models, a single interaction between each R&R variable and an age of house variable was included as an additional explanatory variables in the baseline model. The significance of the interactions was examined in an attempt to identify differences in risk due to lead exposure between R&R activities performed in pre- and post-1980 homes. When the age of house variable

Wisconsin [sic Milwaukee] and Racine counties are Caucasian, only 67 percent of those selected for the study and 78 percent of those participating were Caucasian). *Id*. at 26.

[74] *Id.* at A-5.

[75] *Id.* at 14.

was defined as either pre- or post-1980, the interaction term in all the models was insignificant. Hence the available data did not provide any evidence that the 1978 ban on lead-based paint affected the odds of elevated blood-lead concentrations in children as a result of R&R activities. Similar analysis using a three-level age of house variable (pre-1960, 1960-1980, and post-1980) produced the same results. There are many possible reasons for this finding:

1. Age of residence was an interview reported variable, and, thus, may have been reported inaccurately for some homes.
2. Only the manufacturing of lead-based paint was banned in 1978. Residences may have been painted with lead-based paint using old paint.
3. R&R activities in residences may increase risk due to childhood lead exposure by stirring up lead-contaminated dust from sources other than lead paint.[76]

This finding raises serious concerns about the Wisconsin study. Apparently, the relationship between RRP activities and elevated blood-lead levels is the same whether the children lived in a house completed before or after 1980. The conventional wisdom is that RRP activities disturb lead paint, which creates lead dust, which leads to elevated blood-lead levels in children. But houses built after 1978 are highly unlikely to contain lead paint, raising the question of why RRP work in houses built after 1978 appear to elevate blood-lead levels by as much as RRP work conducted in homes built before 1978. According to the study, renovations are causing elevated blood-lead levels in homes that should not have any sources of lead. The study suggests three possible explanations; none of them account for the lack of significance of house age.

The first possibility is that people simply misreported the ages of their homes. While it is possible that some residents may not know the exact age of their homes, they should be expected to report whether or not it was built before or after 1980 with a reasonable amount of accuracy—especially since about half reported their homes had been built before 1950.[77] Furthermore, while the date homes were built does not appear on Wisconsin property tax bills, it does appear on forms filed by local assessors. Property in Wisconsin is valued each year as of January 1. When the value of a property changes from the prior year, the owner is sent notice of the assessment, which includes Open Book dates listing construction and subsequent improvements. The state encourages property owners to review their Property Report Card with the assessor during the Open Book Period to assure that the information on their property is correct. Construction dates are featured prominently at the top of these forms. Not only should living in their homes provide property owners with a pretty good idea of how old they are, but shifting property values ensure that they receive reminders fairly frequently.[78] Of course, many participants may have simply been renting their homes and not possessed the same

[76] *Id*. at 48-49.
[77] *Id.* at A-5.
[78] This information was provided by Jennifer J. Miller, who is a Property Assessment Practices Specialist with the Bureau of Assessment Practices within the Wisconsin Department of Revenue. Furthermore, she is of the opinion that Wisconsin "property owners are aware of the age of their homes." E-mail from Jennifer J. Miller (Mar. 14, 2006) (copy on file with author).

familiarity as homeowners or received the same reminders from the state. However, this is unlikely to have had enough of an impact to explain the result. About three-quarters of all respondents (2,782/3,650) reported that they lived in a "single family home," while only 283 lived in a "condominium/apartment with 4 or fewer units," and 18 lived in a "condominium/apartment with 5 or more units."[79] Respondents were thus largely living in houses, and should therefore be expected to be more familiar with the date of construction than people living in rental apartment buildings. Furthermore, the majority of respondents who reported homes built before 1980 placed their building date decades before 1980.[80] A large number of mistakes of this magnitude seem unlikely. Had the majority of homeowners reporting homes built before 1980 dated their homes in the 1970s, then perhaps there might have been some reason to attribute the unlikely result to minor errors in dates. However, there is little reason to believe that respondents misjudged the age of their homes to such an extent that they could not place their construction to before or after 1980.

The second possible explanation offered in the study is that because only the manufacture of lead-based paint was banned in 1978, residual stocks may still have been available and used in post-1980 construction. While it is possible that some leftover lead paint may have been available and perhaps even found its way into a few homes, it is implausible that there would have been enough to explain the parity in elevated blood-lead levels in renovated homes built before and after 1980. Furthermore, the assumption that that lead-based paint would have been widely available after 1980 is highly questionable. Although the manufacture of lead paint was officially banned in 1978, it had fallen out of use long before the formal ban. As previously mentioned, paint with reduced lead content first appeared in the 1940s.[81] The industry as a whole adopted a one percent by weight limit in 1955, while lead-free paint became widely available after 1960.[82] Thus, leftover stocks of lead-based paint do not appear to be a reasonable explanation for the parity found by the study in elevated blood levels between renovated pre- and post-1980 homes.

Lastly, the study suggests that RRP activities may stir up lead contaminated dust from sources other than lead paint. Unfortunately, the study provides no information about these other potential sources of lead dust. Considering that lead has long been banished from pipes, solder, "tin" cans, and silverware, there are few possible sources.[83] One possible cause might be soil contaminated by decades of automobiles burning leaded gasoline. While some RRP work disturbs contaminated soil, this would be limited to more extensive RRP work and still is unlikely to be enough to account for the observed parity between pre- and post-1980 homes. Moreover, even if this is the case, then EPA's proposed regulations are targeting the wrong cause of childhood blood-lead levels. The agency's resources would be better spent educating parents about the risks posed to children from eating contaminated soil.

[79] WISCONSIN STUDY, *supra* note 39, at A-5.
[80] *Id.* at A-5.
[81] Ellen Ruppel Shell, *An Element of Doubt*, THE ATLANTIC MONTHLY, Dec. 1995, at 24.
[82] MOORE, *supra* note 28, at 86-87.
[83] See *Id.* at 84-85.

D. The Wisconsin Childhood Blood-Lead Study's Reported Findings

The subjects selected for the Wisconsin study are more likely to have elevated blood-lead levels than the general population. They are also poorer, more likely to be a member of a minority group, and to live in older, dilapidated housing. Despite these potential sources of bias, the study's authors still argued that the cohort would not skew the results.

> Although incomplete reporting, i.e., the large percentage of unknown race children, is a problem for any study, the data selected for this study does not need to be representative of a particular group of children to achieve the primary study objectives. The primary purpose of this study was to establish a dose-response relationship between incidence of general and specific R&R activities and EBLs. This dose-response relationship is assumed to be applicable to many similar populations.[84]

The study's authors are correct: The Wisconsin cohort may exhibit a dose-response relationship similar to that of other populations. However, determining whether this is correct, hinges upon the proper application of statistical controls. Because being poor and/or a member of a minority group definitely contributes to having an elevated blood-lead level, the study should have controlled for these (and other) factors. Unfortunately, the Wisconsin study bases its conclusions on the *unconditional* odds ratios, i.e. those which do not reflect the adoption of such controls. While the study's authors did provide estimates conditional on the addition of these explanatory variables to the baseline model, such as parents' education level, income, presence of peeling paint, these results were not mentioned in the conclusion.

The Wisconsin study's conclusion emphasizes the *unconditional* finding that any RRP work resulted in a greater chance of an elevated blood-lead level. The odds ratio was 1.309 with a confidence interval running from 1.035-1.656 and a p-value of 0.022.[85] This implies that a researcher can be 98 percent certain that children whose homes experienced some sort of renovation within the last year have a roughly 30 percent higher chance of an elevated blood-lead level.

The p-value indicates how certain we can be of the odds ratio and the corresponding confidence interval. The closer the p-value is to zero the greater the certainty, and subtracting the p-value from one reveals the percentage of certainty. For example, one minus the p-value (1.0 – 0.022) is 0.978 or roughly 98 percent. 95 percent certainty (p-value 0.05 or less) is the generally accepted standard for statistical significance, although 90 percent (p-value 0.1) is sometimes used, which was the case for the Wisconsin study.[86] The confidence interval represents the possible range of the odds ratio.

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[84] WISCONSIN STUDY, *supra* note 39, at 26.
[85] *Id.* at 44.
[86] It should be noted that the Wisconsin study would also occasionally use the standard 95 percent (0.05 p-value) measure of statistical significance but mostly relied on the 90 percent threshold. *See Id.* at 31, 34-35.

In the case of the impact of "having any R&R work done" on elevated blood-lead levels, the effect could have been as small as 3.5 percent (1.035) or as high as 65.6 percent (1.656). Simply put, based on the amount of data collected, the authors of the Wisconsin study could say with 98 percent confidence that having "any R&R work done" could increase the chance of an elevated blood-lead level in children by between 3.5 and 65.6 percent. However, despite the wide range, the most probable odds ratio was weighted to around 1.309 or about 30 percent. In addition to showing the full range of possible variables, the confidence interval also serves as a measure of statistical significance. As long as the lower range of the confidence interval is above one, then it can be said (in this case with 98 percent confidence) that there is a connection between having "any R&R work done" and the likelihood of elevated blood-lead levels.

While this result is highlighted in the conclusion, it does not tell the full story. The study reveals curious uncontrolled results that are not discussed in the conclusion, for example:

- Inside Painting: Inside painting could not be linked to a higher risk of elevated blood-lead levels.[87]
- Window Replacement: Window replacement could not be linked to a higher risk of elevated blood-lead levels.[88]
- Prepared Surface for Inside Painting: Although it came close to statistical significance, having a prepared surface for inside painting could not be linked to a higher risk of elevated blood-lead levels.[89]
- Hand Sanding or Scraping: Hand sanding or scraping could not be linked to a higher risk of elevated blood-lead levels.[90]
- Power, Sanding, Grinding, or Sandblasting: Power, sanding, grinding, or sandblasting could not be linked to a higher risk of elevated blood-lead levels.[91]

At the other end, there are some unconditional variables that can be statistically significantly counted on to increase the chance of an elevated blood-lead level, prior to the application of the baseline explanatory variables.

- Inside or Outside Painting: Inside or outside painting (not to be confused with just inside painting isolated as mentioned above) should increase the chances of an elevated blood-lead level by about 32 percent.[92]
- Prepared Surface: A prepared surface should increase the chances of an elevated blood-lead level by about 43 percent.[93]
- Use of an Open Flame Torch: Use of an open flame torch should increase the chances of an elevated blood-lead level by nearly five times.[94]

[87] The odds ratio is 1.010, but the p-value is 0.9267, and the confidence interval is 0.814-1.252. *Id.* at 44.
[88] The odds ratio is 1.095, but the p-value is 0.4652, and the confidence interval is 0.855-1.402. *Id.*
[89] The odds ratio is 1.325, but the p-value is 0.0645, and the confidence interval is 0.977-1.796. *Id.*
[90] The odds ratio is 1.226, but the p-value is 0.1158, and the confidence interval is 0.946-1.588. *Id.*
[91] The odds ratio is 1.372, but the p-value is 0.1035, and the confidence interval is 0.930-2.025. *Id.*
[92] The odds ratio is 1.322, the p-value is 0.0116, and the confidence interval is 1.060-1.649. *Id.*
[93] The odds ratio is 1.430, the p-value is 0.0038, and the confidence interval is 1.117-1.1830. *Id.*
[94] The odds ratio is 4.883, but the p-value is 0.0101, and the confidence interval is 1.423-16.759. *Id.*

- Use of a Heat Gun: Use of a heat gun should increase the chances of an elevated blood-lead level by about four and a half times.[95]
- Washing, Wetscraping, Water Blasting: Washing, wetscraping, water blasting should increase the chances of an elevated blood-lead level by about 62 percent.[96]
- Chemical Paint Removers: Use of chemical paint removers should increase the chances of an elevated blood-lead level by 97 percent.[97]

By itself inside painting is not statistically significant, but the combined category of inside or outside painting is. If a surface is prepared for either inside or outside painting, then it is statistically significant, but just preparing a surface for inside painting is not. The implication is that while inside painting does not appear to pose a risk, outside painting probably does.[98] In fact, after the study adjusted for additional variables in the baseline model, inside painting actually decreased the probability of elevated blood-lead levels with statistical significance. The odds ratio for inside painting lowering the risk of elevated blood-lead levels was 2.432, with a p-vale of <0.0001, and a confidence interval of 1.605-3.685, so inside painting appears to lower the probability of an elevated blood-lead level by nearly two and a half times. Preparing a surface for inside painting also appeared to lower risk, but not with statistical significance. However, hand sanding or scraping conditional on a prepared surface does reduce the risk of an elevated blood-lead level with an odds ratio of 2.795, a p-value of 0.0026, and a confidence interval of 1.411-5.538.[99]

Interestingly, refining the model to take possible confounders into account negated the influence of having any RRP work done on elevated blood-lead levels. Table 3-14 of the study lists any RRP work as having an odds ratio 1.039, a p-value of 0.8516, and a confidence interval of 0.690-1.565.[100] Not only is having any RRP work no longer increasing the risk of an elevated blood-lead level (EBL), but sanding and scraping and inside painting appear to cut the risk by more than half.

Although not mentioned in the conclusion, the study's more complete findings are in Table 3-14, which presents the impact of variables after controlling for the other explanatory variables in the baseline model—here is a summary of the results:

- Any RRP Work: The odds ratio that any RRP work raises the chance of elevated blood-lead levels is 1.039, the confidence interval is 0.690-1.565, and the p-value is 0.8518. After adjustments have been made for the baseline variables shown to explain elevated blood-lead levels, the Wisconsin study

[95] The odds ratio is 4.597, but the p-value is 0.0001, and the confidence interval is 2.715-7.782. *Id.*
[96] The odds ratio is 1.625, but the p-value is 0.0092, and the confidence interval is 1.119-2.360. *Id.*
[97] The odds ratio is 1.969, but the p-value is 0.0046, and the confidence interval is 1.220-3.176. *Id.*
[98] This may be related to the observation above, that soil contaminated by lead from old fuels may contribute to certain children's blood-lead levels. But it also begs the question as to whether the threat to children is not the presence of lead-contaminated dust in the home, but the eating of leaded dirt that is either a product of prior leaded fuel use or the gradual leaching of lead into the soil from flaking or deteriorating exterior paint.
[99] WISCONSIN STUDY, *supra* note 39, at 47.
[100] *Id.* at 47.

cannot claim that any RRP work increases the risk of elevated blood-lead levels in children.

- Inside Painting: The odds ratio that inside painting reduces the probability of elevated blood-lead levels is 2.432, the confidence interval is 1.605-3.685, and the p-value is <0.0001.
- Inside or Outside Painting: The odds ratio that inside or outside painting increases the chance of elevated blood-lead levels is 2.517, the confidence interval is 1.484-4.268, and the p-value is 0.0005.
- Prepared Surface for Inside or Outside Painting: The odds ratio that preparing a surface for inside or outside painting increases the probability of elevated blood-lead levels is 2.537, the confidence interval is 1.232-5.224, and the p-value is 0.0099.
- Prepared Surface for Inside Painting Only: The odds ratio that preparing a surface for inside painting only decreases the probability of elevated blood-lead levels is 1.629, the confidence interval is 0.871-3.048, and the p-value is 0.1189.
- Hand Sanding or Scraping: The odds ratio that hand sanding or scraping decreases the probability of elevated blood-lead levels is 2.795, the confidence interval is 1.411-5.538, and the p-value is 0.0026.
- Use of a Heat Gun: The odds ratio that using a heat gun to prepare a surface increases the probability of an elevated blood-lead level is 4.138, the confidence interval is 2.269-7.548, and the p-value is 0.0001.
- Other in Household: The odds ratio that having someone in the household other than the head of the household or their spouse conduct RRP work decreases the probability of elevated blood-lead levels is 4.456, the confidence interval is 1.502-13.225, and the p-value is 0.0060.
- Friend or Relative Not in Household: The odds ratio that having a friend or relative not living in the household conduct RRP work increases the probability of elevated blood-lead levels is 2.339, the confidence interval is 1.324-4.131, and the p-value is 0.0028.[101]

Despite these results, the study concluded:

> This study demonstrated that general residential R&R is associated with an increased risk of EBLs in children and that specific R&R activities are also associated with an increased in the risk of EBLs in children. In particular, removing paint (using open flame torches, using heat guns, using chemical paint removers, and wet scraping/sanding) and preparing surfaces by sanding or scraping significantly increased the risk of EBLs. Overall, these results agree with those from earlier phases of the R&R study—R&R activities that disturb lead-based paint increase the risk of exposure to occupants. Additionally, children living in a residence while R&R was conducted were 1.3 times more likely to have EBLs than children who did not live in a residence while R&R was conducted.[102]

[101] *Id.* at 47.
[102] *Id.* at 51.

As discussed above, aspects of this conclusion are not substantiated by the actual study:

1. While there was a statistically significant connection between any RRP work and elevated blood levels when it was evaluated as a single, unconditional variable, this connection evaporated as additional explanatory variables from the baseline were added to the model.[103] The report's unadjusted tables 3-12[104] and 3-13[105] show a statistically significant connection between any RRP and elevated blood-lead levels, but the final adjusted table 3-14 shows no statistically significant connection.[106] Once the baseline variables have been taken into account, the Wisconsin study cannot claim a link between any RRP work and elevated blood-lead levels in children.

2. The preparation of surfaces for inside painting, even when using scraping and sanding, does not appear to result in elevated blood-lead levels.[107] However, combined inside and outside painting results in the opposite conclusion.[108] As outside painting is not broken out as a different category, we are left to assume that it is outside painting that contributes to statistically significant mal effects. The conclusion should mention this distinction, as it would be useful to inform regulators that inside painting and preparation does not appear to elevate blood-lead levels, while outside painting does.

3. The effects of open flame torches are much discussed in the study. However, an examination of the study's appendix reveals that only six persons responded that they had prepared a surface for inside painting with an open flame torch. Of these six persons, only one had a child with an elevated blood level of more than 10µg/dL.[109] A few more persons (44) used heat guns, and nine of their children had blood-lead levels in excess of 10µg/dL.[110] The ratios appeared much the same for outside use of open flames and heat guns. Two out of five children in homes where open flames had been used to prepare outside surfaces for painting reported elevated blood-lead levels, while the count was nine out of twenty-four for heat guns.[111] These percentages are high, but the small sample sizes cast doubt on whether those percentages support a correlation between open flame torches and elevated blood-lead levels.

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[103] The baseline included variables known to have an effect on blood-lead levels including peeling, paint, home age (before and after 1960), whether occupants rented or owned their homes, the type of residence (single family, apartment, duplex, etc.), whether the child was on medical assistance, income (under or over $30,000 a year), the number of people in the home, education level of parents, child's age, and any known adult lead exposure. Table 3-9, WISCONSIN STUDY, *supra* note 39, at 38. The effects of these variables on elevated blood-lead levels can be viewed on Table 3-10, at 41.

[104] *Id*. at 44.

[105] *Id.* at 45.

[106] *Id.* at 47.

[107] *Id.* at 47.

[108] *Id.* at 44, 47.

[109] *Id.* at A-13.

[110] *Id.* at A-13.

[111] *Id.* at A-21.

4. The study's assertion that these results agree with those from the earlier phases of the R&R study that "R&R activities that disturb lead-based paint increase the risk of exposure to occupants"[112] is somewhat confusing. True, the previous phases of the R&R study did find that renovation workers were exposed to lead dust, but this failed to result in higher blood-lead levels. Furthermore, while the Wisconsin study appeared to find a connection between outside painting and increased risk of elevated blood-lead levels, no such connection was found for inside preparation and painting. Additionally, unlike Phases I and II, the Wisconsin study did not measure lead-dust concentrations, and its finding that RRP work resulted in elevated blood-lead levels did not survive the addition of explanatory variables taken from the baseline. However, the appropriate conclusion to draw from the Wisconsin study is that RRP activities do not appear to elevate blood-lead levels, which is the same conclusion reached by Phases I and II.

There are many problems with the Wisconsin Childhood Blood-Lead study; the most glaring of which is that its conclusion does not match its content. There were also significant problems involving selection bias, as the population of subjects were overwhelmingly poor and lived in much older housing. Furthermore, 230 of the 285 children with elevated blood-lead levels did not live in their homes while the RRP work was conducted, which creates the possibility that they owed their elevated blood-lead levels to a cause other than renovations.[113] Aside from its difficulties with faulty conclusions and selection bias, the Wisconsin study also reaches some strange conclusions. The fact that RRP work appeared to increase the chance of elevated blood-lead levels in homes that should not have had any lead in them has already been discussed, but some of the study's univariate and uncontrolled findings, upon which it decided to base its conclusions, should be mentioned. For example, while the study found that RRP work elevated blood-lead levels, it also discovered that not doing RRP work or entrusting the job to someone who was not an "other in household,"[114] also increased risk.[115]

Paradoxically, the strongest association observed by the study is that having RRP work done by someone who was an "other in household" reduced the risk of elevated blood-

[112] *Id.* at 51.
[113] *Id.* at D-11.
[114] "Other in household" simply refers to someone living within the household, who is not the head of the household or his or her spouse.
[115] "Results also indicate that the odds of an elevated blood-lead concentration is higher if R&R work is either not done or conducted by someone that is not an "Other in household" than the odds if R&R is conducted by an "Other in household." The odd feature of this result is that no R&R work done is a subset of the higher risk group. This last result is the only statistically significant result in this study that indicates that an R&R activity of any type conducted by an individual could reduce the risk due to lead exposure. The univariate logistic regression also showed that someone not in the household carrying out the work reduced the odds of an EBL, although the result was not statistically significant (Appendix D)." WISCONSIN STUDY, *supra* note 39, at 43.

lead levels by a factor of three.[116] This figure was not only statistically significant but rose to 4.456 once the baseline explanatory variables had been taken into account.[117]

Like this one, some findings of the study are surprising and hard to explain, but others provide interesting insights into the activities that are most likely to increase blood-lead levels, and possible responses. By focusing solely on the unrefined statistical results, however, EPA not only overstates the value of regulating RRP generally, but misses opportunities to target actions likely to be most effective at reducing risks. In the context of the RRP rulemaking this is particularly important since, as discussed in the next section, the critical issue is the tradeoff between increasing exposure to lead dust through the substitution of non-professional RRP projects for professional ones.

IV. The Economics of Remodeling and Renovations

Remodeling is a significant business. The nation's stock of housing currently stands at approximately 120 million units. New construction adds 1.5 million homes to the base every year, and the rising stock is forever in need of maintenance and upgrading.[118] In 2003, homeowners and rental property owners spent $233 billion on remodeling. This accounted for 40 percent of all residential construction and improvement and more than two percent of the U.S. economy.[119] Accordingly, any new regulations that impose new costs on the industry are likely to be a large burden to the economy. The National Association of Homebuilders estimates that the proposed rules covering certification requirements for renovators will cause renovation delays and increase costs.[120] While it is difficult to ascertain exactly what will be the final cost to renovators, industry insiders estimate that the cost of RRP work could rise between 20 to 30 percent.[121] This section will explore the nature of the home remodeling and renovation industry, and assess the likely impact of higher renovation costs on behavior and the implications for lead exposure.

Homeowners contemplating a RRP project have three choices: they may hire a professional to complete the project, they may do the project themselves, or they could postpone the project to a later date. Homeowners' choices between these options are affected by their relative costs. Because certification and training requirements apply only to the professionals, on the margin they will cause a substitution toward do-it-yourself remodeling and away from professional remodeling. Furthermore, higher costs will lead some homeowners to postpone needed renovations. EPA must therefore

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[116] "The surprising result that was consistent across all the multivariate models is that the odds of a child having an elevated blood-lead concentration is significantly lower if the surface preparation was carried out by someone in the household other than the head of household or spouse." *Id.* at 47.

[117] *Id.*

[118] *The Changing Structure of the Home Remodeling Industry*, JOINT CENTER FOR HOUSING STUDIES OF HARVARD UNIVERSITY 2 (2005) [hereinafter Home Remodeling].

[119] *Id.* at 1.

[120] Press Release, National Association of Home Builders, New Lead Paint Rule Not a Fix, NAHB Says (Dec. 29, 2005), *available at* http://www.nahb.org/news_details.aspx?sectionID=194&newsID=1654.

[121] E-mail from Mr. Burt Olhiser, Director of Operations, Kleen Industrial Services (Mar. 7, 2006) (copy on file with author) [hereinafter Olhiser].

consider the extent of this substitution effect and compare its impact to the reduction in lead exposure from improving professional RRP activities through certification and training. Only certification and training requirements that produce a net decline in lead exposure are justified. The previous section raised questions about the basis for concluding that RRP activities produce significant lead exposures. In this section we discuss the substitution effect.

While EPA recognizes that higher prices for professional renovation, repair, and painting services resulting from this rule could lead homeowners to conduct the activities themselves or postpone them,[122] its Economic Analysis (EA) does not account for these effects.[123]

This is a serious flaw in EPA's analysis, which will overstate the benefits of the proposed requirements. The very real opportunity cost of the rule—that the costs of the requirements will lead to do-it-yourself efforts or postponement of needed repair in old homes with deteriorating lead paint—must be considered if EPA is to achieve its goal of reducing (not increasing) exposure of children to harmful lead.

A. The Size of RRP Firms and Regulation

The vast majority of home remodeling is conducted by small businesses; they, along with homeowners, will bear the brunt of the new regulatory costs. In 2003, the top 10 home remodeling firms controlled just one percent of homeowner's payments to contractors. If the aggregated billings of the nation's top 500 are added together, they account for less than 4 percent of total contractor revenue.[124]

Less than 10 percent of remodeling contractors with payrolls reported annual revenue of $1 million or more, while almost 30 percent reported receipts of less than $100,000. Average revenue for self-employed remodelers was much lower.[125] The primary reason that renovators are often small businesses is because most remodeling business is local. Contractors have to worry not only about local building codes and their enforcement, but need to be familiar with the types of homes in the community and the demand for varying kinds of remodeling projects. Expansion into new areas requires that contractors broaden their knowledge and project mix. While business expansion is generally something we all view favorably, in the remodeling business moving into new areas and offering new products "can take a remodeling business beyond its core competence and familiar geographic area."[126] The remodeling industry is not conducive to big business, and the economies of scale that come with it. Most remodelers are small businesses, simple

[122] See Environmental Protection Agency, Economic Analysis for the Renovation, Repair, and Painting Program Proposed Rule ch. 3, at 41 (Feb. 2006) [hereinafter Economic Analysis].
[123] "Because of the lack of detailed price elasticity estimates for RRP, the analysis in the Chapters 4, 5 and 6 do not incorporate any reduction in professional RRP activities in response to the cost increases resulting from the regulation." ECONOMIC ANALYSIS, at ch. 3 p. 43.
[124] Home Remodeling, *supra* note 118, at 5.
[125] *Id.* at 14.
[126] *Id.* at 14.

partnerships, or lone handymen. Any proposed regulatory burdens should be considered very carefully, as they should be expected to hit this industry particularly hard.

While firms in the general economy have tended towards bigness and economies of scale, the trend in the remodeling business continues to be towards specialization. Especially in high-end renovation, it is common for a large number of small firms each to concentrate on a specific task in line with their narrow area of expertise.[127] Thus, the proposed application of the rules to "all renovations for compensation performed in target housing"[128] will likely prove unduly broad. A specialized firm brought in for some specific role may have little contact with lead paint or dust, yet still exceed the $2ft^2$ exemption threshold set by EPA and have to undergo the cost and expense of meeting the new requirements.

While the home renovation and remodeling industry is growing fast across the entire nation, its most dramatic growth is concentrated in the South and West. In 2003, the value of remodeling permits in the South and West increased at a double-digit pace, but only about half that rate in the Northeast and Midwest. Areas experiencing the most growth were primarily located in the Sunbelt states.[129] Although the industry's growth has primarily been focused in the South and West, due to past construction trends and population densities, the vast majority of homes thought to contain lead-based paint are located in the Northeast and Midwest.[130]

B. Who Pays and How Much for Professional Home Remodeling?

EPA's proposed rules are intended to reduce the amount of lead dust created by professional home remodelers and renovators with the hope that less lead will find its way into the blood of children. The problem is that most of the people spending most of the money on remodeling are older people, who are less likely to have young children and more likely to employ professional remodelers. The baby boom generation has been the mainstay of the remodeling industry for decades and their spending has increased as they reach retirement. [131] Here is the breakdown of remodeling spending by age group in 2003:[132]

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[127] *See Id.* at 14.
[128] 71 FR 1588.
[129] Home Remodeling, *supra* note 118, at 4.
[130] "Approximately 36% of the housing in the Northeast and Midwest had lead-based paint hazards, compared with about 16% of housing in the South and West." David E. Jacobs et al., *The Prevelance of Lead-Based Paint Hazards in U.S. Housing*, 110 ENVIRONMENTAL HEALTH PERSPECTIVES A 599, A 602 (Oct. 2002), *available at* http://www.hud.gov/offices/lead/techstudies/LeadPaintHousingSurvey.pdf.
[131] Home Remodeling, at 19.
[132] *Id.* at 20.

TABLE 4

Generation	Percentage of RRP Spending
Pre-Depression Generation (born before 1929)	5%
War & Depression Generation (born 1929-1945)	20%
Baby Boom Generation (born 1946-1964)	52%
Generation X (born 1965-1974)	20%
Echo Boom Generation (born 1975 and later)	3%

The youngest of the baby boomers are now 42 and less likely to have young children in the home. If only the baby boomers and older generations are considered, then those who are least likely to have young children are spending 77 percent of the money spent on home renovations.

According to the National Center for Health Statistics, 51.8 percent of births in the U.S. were to women aged 20-29. 11.3 percent were to women younger than 20, while 34.5 percent were to women aged 30-39, and only 2.4 percent to women over 40.[133] Most of the babies born in this country are born to people who are not spending any money on their houses. Moving roughly 7 of the 34.5 percent[134] attributable to the 30-39 age group and into the echo boom generation, leaves 11.3percent (under 20s) + 51.8 percent (20-29) + (7.0 percent 30-32) = 70.1 percent. About 70 percent of the children are being born to people who account for three percent of the money being spent on housing renovations. Even if we extend the childbearing age so that it includes all of generation X, nearly 100 percent of American children are being born to those spending only 23 percent of the money on renovations.

There are also differences in how the money is spent, with echo boomer and generation X spending a greater proportion of their RRP money to do-it-yourself (DIY) activities. Table 5 presents the average actual dollar amounts spent on professional and DIY work in 2003 for each generation. The last column reflects the percentages of renovation dollars spent on professional RRP work.[135]

[133] This covers averages between 2000 and 2002 and is courtesy of the March of Dimes, *available at* http://www.marchofdimes.com/peristats/level1.aspx?reg=99&top=2&stop=5&lev=1&slev=1&obj=3.

[134] This is done in order to square the National Center for Health Statistics Data with the generational spending data contained in *The Changing Structure of the Home Remodeling Industry*. The echo boom generation mentioned in *The Changing Structure* contains a number of 30 and 31 year old women. Although birthrates in the first years of the 30-39 age group should be expected to higher than later years, for simplicity's sake, they have been divided equally. If the 34.5 percent of births attributable to 30-39 year-olds are divided equally by year, then roughly 7 percent of the 34.5 belongs in the echo boom generation.

[135] Home Remodeling, *supra* note 118, at 20.

TABLE 5

Generation	Average Spent on Professionals	Average DIY Expenditures (does not include time)	Percentage of RRP Expenditures Going to Professionals
Echo Boomer (born 1975 and after)	$600	$600	50%
Generation X (born 1965-1974)	$1,300	$900	59%
Baby Boomers (born 1946-1964)	$1,600	$600	73%
War & Depression (born 1929-1945)	$1,300	$200	87%
Pre-Depression (born before 1929)	$700	$100	88%

It should be noted that the figures for DIY expenditures do not take into account the time of those doing it, so the real amount spent on DIY is considerably higher. However, if we take the numbers at face value, then those having the most children (the echo boomers) are only spending about half of their remodeling budget on professionals. If echo boomers only account for 3 percent of remodeling spending, then only about 1.5 percent of all remodeling spending is going to professionals to do work in the homes of those having roughly 70 percent of the children.

There is also the important question of what kinds of "professional help" these people are purchasing. Homeowners undertake 50 million renovations a year, and nearly six out of ten of these projects involve some sort of professional help. However, the professionals involved are usually specialty contractors, such as plumbers, electricians, and roofing or siding contractors.[136] Older homeowners generally rely to a greater extent on professionals, but it would appear that younger persons are more likely to employ professionals only for highly specialized roles, such as plumbing, roofing, siding, and electrical work. The sensible conclusion is that the homeowners most likely to have young children are also the most likely to carry out the renovation activities targeted by the proposed EPA regulations themselves.

Although professionals provide crucial services in home remodeling, the trend appears to be towards more do it yourself and the employment of smaller contractors. This trend has been helped by the expansion of large building product retailers, such as Lowe's and Home Depot. These retailers have begun offering small contractors and do it yourselfers the types of services previously provided only by professional dealers.[137] For example, most major retailers now provide such value-added services as helping customers resolve product disputes, advising on project design and material selection, estimating materials

[136] *See Id.* at 14.
[137] *Id.* at 17.

needed for projects, and ensuring next-day delivery to a job site.[138] Professional dealers in lumber and building materials have been moving away from remodeling and dealing more with homebuilders.[139] Large retail stores have taken up the slack. The result has been that these stores have improved the ability of small contractors and do it yourselfers to take on more complicated jobs. The market is increasingly becoming friendlier to small renovators and homeowners. The expanding roles and capabilities of smaller contractors and do it yourselfers are likely to complicate the imposition of EPA's new rules. If the prices of professional remodeling services go up, then homeowners have much improved opportunities to substitute their own work or that done by individual handymen flying below the regulatory radar screen.

In addition to increased competition and substitution from homeowners, EPA's proposed regulations could impose additional costs on remodelers and renovators and higher prices on consumers just as rising interest rates appear poised to dry up a large source of funding for RRP work. According to Freddie Mac, homeowners cashed out about $333 billion in home equity between 2001 and 2003—nearly triple the level in the previous three-year period. Estimates from the Federal Reserve Board indicate that approximately one-third of the proceeds from cashed-out refinances from January to June 2002 went to home improvement spending.[140] If interest rates continue to rise and the housing markets cool, then homeowners will lose their ability to finance renovations and improvements via home equity. After years of expansion, contractors may see difficult times ahead, which new regulatory burdens can only make worse.

The remodeling industry is ill-suited to absorb the cost that EPA's new regulations will impose on it. As most contractors are small, specialized, and local, they lack the efficiencies brought through economies of scale and consolidation that can often temper regulatory burdens. Furthermore, there are serious questions as to whether or not rules governing the conduct of renovation professions will have any impact on children's blood-lead levels. As we have seen from the Joint Center for Housing Studies' report on the remodeling industry, nearly all of the money spent on professional renovation services comes from older homeowners, who are unlikely to have small children. Not only are younger homeowners more likely to do things themselves, but they frequently only call in contractors for highly specialized work, such as plumbing, roofing, siding, or electrical work. Young homeowners already appear to be doing most of their own preparation and painting, and increasing the cost of like professional services can only lead to more substitution towards do it yourself work.

V. Likely Impacts of the Proposed Regulations

Regulations relating to lead paint raise many complicated questions. As discussed above, modern exposure to lead has diminished markedly over the last few decades. Studies have failed to find a relationship between high concentrations of lead dust and higher

[138] *Id.*
[139] *Id.*
[140] *Id.* at 9.

blood-lead levels in workers.[141] The Wisconsin Childhood Blood-Lead Study may have reported a link between renovations and higher blood-lead concentrations, but closer examination of the study revealed this is misleading, as specific activities, such as interior preparation and painting failed to account for statistically significant increases in risk.[142] Furthermore, the Wisconsin study did not adequately explain why renovations appeared to cause elevated blood-lead levels in houses built after 1980 that should not have had any lead in them.[143] Lastly, small, specialized firms characterize the renovation industry and are unlikely to carry regulatory burdens well. Older homeowners, who are unlikely to have young children, also primarily employ professional firms, while younger homeowners are more likely to do things themselves. With younger homeowners already doing most of the work themselves, any increase in the price of professional services can only serve to increase this ratio.

As previously mentioned, EPA is under a statutory mandate to create a certification program for RRP workers. However, evidence collected following the passage of the statute has indicated that lead hazards created by renovation and remodeling work are minimal, and RRP work removes chipping and deteriorating paint—two of the leading causes of elevated blood-lead levels. Therefore a reasonable interpretation of the statute would be for EPA to adopt the least costly and most flexible training and certification programs possible. Reductions in lead dust during and after renovation can be achieved with simple training and without expensive equipment. The marginal gains in lead exposure reduction from more complex, expensive requirements have the potential to shift RRP work to untrained homeowners from trained professionals. Since completely untrained homeowners will be likely to produce greater lead dust exposure than trained professionals, EPA needs to be particularly careful to ensure that the training costs do not make professional RRP work so costly that it produces a net increase in lead exposure through this substitution effect.

Unfortunately, while a few simple measures and an emphasis on cleanup would effectively minimize the already small hazard presented by RRP activities, EPA has chosen a long list of certification requirements and prescribed work practices that will increase substitutions and likely do more harm than good. The list of requirements is extensive, and their costs rapidly add up. The lost time is expensive, as are the $1,000 HEPA vacuums and their $250 filters. Furthermore, the creation of new rules generates new legal liabilities, which will require RRP firms to purchase additional insurance coverage. Although the final tally could be anywhere within a wide range, the proposed rules are definitely not going to make RRP work any cheaper. Industry experts estimate that the proposed rules could raise the price of renovations and remodeling by between 20 and 30 percent.[144] There are disagreements as to the effects of these price changes. EPA believes that RRP work is generally inelastic, while others contend that price elasticity is greater. Unfortunately, the debate is rendered moot by the fact that either elasticity is bad for consumers. If RRP work is inelastic, as EPA claims, then consumers will pay

[141] *See* WISCONSIN STUDY, *supra* note 118 at vii (discussing results of Phases I and II).
[142] *See Id.*, at 47.
[143] *See Id.* at 48-49.
[144] Olhiser, *supra* note 121.

significantly more for renovations and remodeling. However, if RRP work is more elastic in nature, then consumers will either go without or substitute their own services for those of professionals. Either proposition is bad for consumers, who are likely to be saddled with additional costs for minimal benefits and perhaps even increased harms. While the statutory mandate prevents EPA from avoiding the certification of RRP workers, the facts indicate that this process need not be strenuous in order to reasonably comply with the statute. Rather than undergoing extensive training, the employment of time consuming work practices, and the use of expensive vacuums, in order to be effective, certification need only involve a few simple tips emphasizing the importance of a thorough cleanup. The loosening of certification requirements would not only spare consumers the higher costs of RRP work, but potentially prevent the numerous elevated blood-lead levels that would result from either deferring the renovation of flaking or deteriorating paint or exposing children to excess lead dust created by parents who have decided to do work themselves.

A. More People will Do It Themselves

The proposed rule requires:

> [T]hat renovators are 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. The standards would apply to all persons who do renovation for compensation, including renovation contractors, maintenance workers in multi-family housing, painters and other specialty trades.[145]

Unfortunately, by increasing the costs of home renovations, this will cause a substitution effect. Because the rules apply to "all persons who do renovations for compensation,"[146] the proposed rules would apply to everyone from a large renovation company to lone handymen. Not only would individual workers have to be certified or trained by a certified renovator, but the entire firm would itself have to gain certification.

The National Association of Homebuilders believes that these new rules will definitely boost the cost of home renovation and remodeling.[147] With more than 20 years experience in lead paint related regulation, Mr. Burt Olhiser of the Painting & Decorating Contractors of America estimates that the new rules will increase costs between 20 to 30 percent due to increased insurance needs, work practices and other associated costs that contractors will have to pass on to homeowners.[148] While EPA is in agreement that most of the costs of the proposed rules will be passed on to consumers (the estimate mentioned

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[145] ENVIRONMENTAL PROTECTION AGENCY, PROPOSED RULE ESTABLISHING REQUIREMENTS TO PROTECT CHILDREN DURING RENOVATION, REPAIR AND PAINTING ACTIVITIES THAT DISTURB LEAD-BASED PAINT (Dec. 2005), *available at* http://www.epa.gov/lead/pubs/rrpfactsheet.htm.

[146] *Id.*

[147] Press Release, National Association of Home Builders, New Lead Paint Rule Not a Fix, NAHB Says (Dec. 29, 2005), *available at* http://www.nahb.org/news_details.aspx?sectionID=194&newsID=1654.

[148] Olhiser, *supra* note 121.

in the rule is 90 percent),[149] the agency contends that the benefits far outweigh the costs. Using a discount rate of seven percent, EPA estimates the annual cost of the most burdensome regulatory scenario at $629 million, while the annualized estimated net benefits range from $2,754 million to $7,390 million.[150] However, these estimates rely on two doubtful assumptions: (1) that homeowners will pay the higher costs without resorting to substitution of their own services for those of professionals;[151] and (2) that the proposed rules will protect between 780,000 and one million children under six from elevated blood lead levels.[152]

These are just the estimates of costs that will be passed on from existing renovators. They do not account for changes the rule may cause in the market. As remodeling is dominated by small firms, the new rules are likely to either push some firms into other businesses or prevent new firms or individuals from entering the market. The remodeling market may become less competitive and consumers will be hit with overall higher prices in addition to bearing the higher costs directly imposed by the proposed regulations.

NAHB also points out that homeowners themselves already conduct half of all renovations.[153] This indicates a high level of substitutability between do it yourself and hiring a contractor. Therefore, any increase in the costs of renovations is likely to cause a substantial amount of DIY substitution.

Considering the high rate of substitution, homeowners will save money by doing renovations themselves, rather than seeking out trained professionals. This is especially true for demolition work, which can be easily accomplished by anyone willing to wield a sledgehammer or cart away pieces of lead coated wall. Unfortunately, "doing it yourself" may involve the whole family and young children will more likely be exposed than when a contractor does the work. If lead paint is present, DIY poses two enormous risks to young children: (1) The risk that children will participate directly in demolition or ripping out of wall coated with lead paint. Aside from bringing them directly into the work area, this offers children innumerable opportunities to directly ingest contaminated materials. (2) Even if children are excluded from the work area, the renovations have the potential to coat their parents with lead dust. Parents are more likely than contractors to come into contact with their children while still bearing lead dust. Furthermore, mothers and fathers whose clothes are contaminated could contaminate their additional shared spaces with their children, such as cars.

Another set of problems arises from the amount of time spent on renovations by homeowners as compared to professionals. In Phase IV of its R&R study, EPA found that homeowners were likely to spend 14 out of 30 days working on a project, while

[149] 71 FR 1623.
[150] ECONOMIC ANALYSIS, *supra* note 122, at Executive Summary 9.
[151] This conclusion is drawn from EPA's assertion that the price elasticity of demand for R&R (or RRP) work is inelastic. *See*, *Id*. at ch. 3 pp. 22-23.
[152] *Id*. at Executive Summary 6.
[153] Press Release, National Association of Home Builders, New Lead Paint Rule Not a Fix, NAHB Says (Dec. 29, 2005), *available at* http://www.nahb.org/news_details.aspx?sectionID=194&newsID=1654.

professionals spent 24.[154] Although EPA's number for days spent by homeowners seems high (about double what one would expect), it is still considerably less than that spent by professionals. As homeowners have less time in any given month to devote to RRP activities the projects they engage in will inevitably take longer to complete. Not only will the lengthier timetables produce extended periods of elevated lead dust, but, if flaking or deteriorating lead-based paint is involved, then the hazard will persist a little longer than for projects tackled by professionals.

B. Much Needed Renovations Will Be Deferred

According to the National Safety Council, "next to deferred maintenance and unchecked paint deterioration, renovation and remodeling activities are the biggest trigger of lead-contaminated dust and thus a significant contributor to the number of childhood lead-poisoning cases nationwide."[155] This raises two issues. First, if these new rules drive up the cost of renovations, then homeowners are likely to put them off. At the same time, while they are waiting to renovate, they will be deferring maintenance and tolerating increased paint deterioration, because there is little reason to invest in maintenance of a soon-to-be renovated building. If the National Safety Council is suggesting that deferred maintenance and unchecked paint deterioration are larger triggers of lead-contaminated dust than renovation, then it might be better to consider renovation as the least of three evils, and a renovation done under the existing rules as preferable to a postponed renovation occurring under the proposed rules. Second, the National Safety Council simply assumes that since renovation triggers lead-contaminated dust, it is the renovations that are leading to lead poisonings or elevated blood-lead levels. This ignores the common sense notion that lead dust from renovations is unlikely to persist for long periods of time and more likely to subside rapidly after completion and cleanup, while whatever remains gradually diminishes with every cleaning. Furthermore, it should be considered that since older homes containing leaded paint are more likely to be renovated, children showing higher blood-lead levels following renovation might owe their lead ingestion to conditions in the home prior to renovation. Lead dust from renovation, is therefore, a temporary problem, while that produced by deferred maintenance and/or unchecked paint deteriorations is persistent and much more dangerous.

Blood-lead levels are higher for blacks than whites, more prevalent in the poor, and more common in central cities.[156] These higher blood-lead levels are most likely not the result of renovation, but a lack thereof. If EPA's new rule drives up the cost of renovation, it

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[154] ENVIRONMENTAL PROTECTION AGENCY, EXECUTIVE SUMMARY FOR THE REPORT LEAD EXPOSURE ASSOCIATED WITH RENOVATION AND *Remodeling* ACTIVITIES: PHASE IV, WORKER CHARACTERIZATION AND BLOOD-LEAD STUDY OF R&R WORKERS WHO SPECIALIZE IN RENOVATION OF OLD OR HISTORIC HOMES (Mar. 1999), *available at* http://www.epa.gov/lead/pubs/747-r-99-001.htm.

[155] Al Heavens, *On the House: New rules posted for lead-paint removal*, THE PHILADELPHIA ENQUIRER, Jan. 15 2006.

[156] MOORE, *supra* note 28, at 141.

lessens the chances of these at-risk groups of people renovating themselves out of their circumstances. While renovation may kick up lead dust, dust levels fall rapidly even with the most rudimentary cleanup and cannot be expected to fuel prolonged elevated blood-lead levels. It is likely that persistent and continuous exposure to lead from flaking or deteriorating paint poses a much greater danger to children than a one-time renovation. According to the American Academy of Pediatrics, children with the highest blood-lead levels owe them to physical ingestion, while lower, but still elevated levels are possible from sustained exposure to deteriorating paint:

> Children who develop lead encephalopthy with blood lead concentrations of more than 100µg/dL often had chips of lead paint visible on abdominal plain films. Children who live in homes with deteriorating lead paint, however, can achieve blood lead concentrations of 20µg/dL or greater without frank pica.[157]

With phases I, II, and III of EPA's R&R study unable to identify correlations between interior renovations and elevated blood-lead levels, it appears that the more likely causes behind elevated blood-lead levels are ingestion of paint chips and prolonged exposure to deteriorating paint. Therefore, the case should be made that the neutralization of flaking or deteriorating lead paint takes precedence over concerns regarding renovations. Moreover, delaying renovations can perpetuate many other non-lead dangers to children's health. For example, drafty, moldy, or damp houses pose threats that renovation can easily remedy. It should also be kept in mind that older houses are simply not designed as safely as those today. Renovations may kick up lead dust, but they can also cure dangerous physical conditions that can easily harm, or even kill children.

C. A Negative Effect on Low-Income Housing

The new regulations might have a definite effect on the nation's stock of low-income housing. At this time of rising housing prices, it is important to minimize any impediments to affordable housing. At the time EPA promulgated the first lead abatement certification requirements in 1997, Aaron Sussell, head of the Lead Removal Project for the National Institute for Occupational Health and Safety, worried openly about the impact of increased lead abatement costs:

> All the economies are working against … a landlord or a homeowner or an apartment owner … They're being socked with a huge bill, and some of them are saying "I'm not going to pay, I'm just going to tear it down." So more and more low-income housing is getting torn down. [158]

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[157] APP, *supra* note 5, at 1037. "Frank pica" is an interesting term. Pica is an abnormal craving or appetite for nonfood substances, such as dirt, paint, or clay, while frank simply refers to the fact that the presence of paint chips in a child's abdomen makes it plain that the child suffers from pica. *See* THE AMERICAN HERITAGE DICTIONARY 540, 1032 (3ed. 1993). A simple translation would be that children who eat paint chips suffer the highest blood-lead levels (over 100µg/dL), while those without observable paint chips in their abdomens, who have likely been exposed to lead dust from deteriorating paint, are unlikely to have blood levels over 100µg/dL but might exceed 20µg/dL.

[158] MOORE, *supra* note 28, at 96.

If EPA's proposed rules drive up the costs of renovations, then low-income landlords may either defer renovations or tear down their units. Landlords may also seek to defer the higher costs of renovation by renovating for more affluent tenants. Whether by deterioration, demolition, or gentrification, higher renovation costs will arguably reduce the quality and quantity of low-income housing. Tenants maybe forced into even worse conditions or onto the streets, both of which pose significant threats to children's health.

D. Federalism and National Certification

The amount of housing with lead contaminated paint is disproportionately distributed. The states have varying lead paint problems and are in the best position to assess and take action. Conditions in some states have required drastic action. For example, in April 1993 New York mandated annual testing of blood-lead levels for children under the age of seven. Testing is voluntary in Connecticut and New Jersey, but in all three states the finding of a blood-lead level of more than 20µg/dL triggers a mandatory inspection. If the lead levels are high enough, then a homeowner may face an order to remove the lead. In some states and municipalities, homeowners with young children who fail to comply with a lead abatement order may find their children taken away to foster care.[159]

States with perceived lead problems have gone to great lengths to mitigate the problem. As home to many houses containing lead paint, Massachusetts implemented very strict standards on de-leading renovators in the early 1970s. Not only did the Commonwealth impose certification requirements, but it mandated the use of High-Efficiency Particle Accumulator (HEPA) vacuums and forced families to move out during renovations. It also banned the use of machine sanding. Dry scraping of walls had to be done by hand over floors and furniture covered by double layers of plastic.[160]

However, by 1993, perhaps sensing either that they had gone too far, or that the threat had diminished, the Massachusetts legislature relaxed the law, and Commonwealth regulatory liberalization followed soon after. Property owners and unlicensed agents—carpenters or even friends—could perform low-risk deleading, defined as encapsulation, removing doors, shutters, and all interior coverings, such as paneling and wallboard, and the capping of baseboards. Removal of vinyl siding on the exterior was also a "low-risk" activity. Moreover, a family could remain in residence during the performance of low-risk work as long as they stayed out of the work area.[161]

Of course, while state action may be preferable, the fact remains that Congress has ordered EPA to create an RRP certification process. However, the disparities in the nation's lead paint problems add credence to the proposal that EPA create a less burdensome certification program and prescribe fewer work practices. States with more severe lead paint problems can always impose stricter standards, and unwarranted burdens will not be placed on states with newer housing stocks. In light of the statutory

[159] *Id*. at 82.
[160] *Id*. at 129.
[161] *Id.* at 129.

requirement, the uneven distribution of houses containing lead paint is a fact that would make regulatory restraint on the part of EPA in this matter both reasonable and legal.

E. The Effectiveness of the Proposed Regulations may be Limited

Regulations intended to protect children must be about more than their motivations, they must actually serve their purpose. A 1995 report by Batelle for EPA examined the effectiveness of lead abatement and came to the following conclusion:

> When considering the effectiveness of an intervention, it is important to recognize that childhood lead exposure stems from a number of media (e.g., paint, soil, interior house dust, exterior dust) across a range of environments (e.g. child's residence, school, playground, friends' residence). Unless an intervention targets all sources of a child's lead exposure, therefore, even an intervention that fully abates the targeted source will not produce a 100% decline in the child's blood-lead concentration. If other sources of lead remain unaffected by the intervention lead exposure may continue and the child's blood-lead level concentration may remain elevated."[162]

Even if the proposed regulations manage to reduce childhood exposure to lead dust from renovations, they may still not result in lower blood-lead levels. The Wisconsin study indicated a positive correlation between outside scraping, preparation, and painting and elevated blood-lead levels but failed to find a similar connection between inside scraping, preparation, and painting. A possible answer to this strange result could be that any lead dust from interior work is quickly and easily cleaned up, so its effects on children are limited. However, less care is likely taken on outside work, which allows for the scraped paint to settle and leech into the soil, which may already be contaminated from decades of automobiles burning leaded gasoline. Lead finds its way into children as they eat dirt or track contaminated soil through the home. EPA's proposed regulations may ease the temporary creation of lead dust during home renovations, but they will have no impact on soil already contaminated by exterior flaking paint or decades of leaded gasoline emissions. These proposed rules could conceivably cost homeowners and the home renovators billions of dollars while producing little or no impact on childhood lead exposure.

F. Problems with EPA's Economic Analysis

EPA's worst case annual cost scenario is $629 million for the most burdensome version of the proposed rule, while the net annual benefits range from $2,754 million to $7,390 million.[163] However, these figures are a likely underestimation of the costs and overstatement of the benefits.

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[162] ENVIRONMENTAL Protection AGENCY, REVIEW OF STUDIES ADDRESSING LEAD ABATEMENT EFFECTIVENESS, FINAL REPORT iii (Prepared by Battelle July 14, 1995).

[163] ECONOMIC ANALYSIS, *supra* note 122, at Executive Summary 9.

While EPA mentions the possibility of substitution in its Economic Analysis for the proposed rule,[164] its benefit-cost analysis does not take into account either the increase in DIY renovations nor postponement of renovations.[165] It appears to have based this decision on a comparison of RRP work to the demand for housing, which is inelastic, and the fact that RRP work is often done by small firms specializing in individual tasks, which, according to EPA, limits price competition.[166] Furthermore, EPA points out that high income purchasers of RRP services are less likely to be price-sensitive, while owners of rental properties should exhibit the greatest sensitivity to the rising price of professional services.[167]

EPA's conclusions imply that costs imposed by the new regulations will be mainly passed onto high end consumers, while those who will forgo benefits due to the higher costs of professional work will be the (presumably well-off) owners of rental properties. Because of the assumed inelasticity of the demand for RRP services, providers of these services should not suffer.

EPA's reasoning is partially correct. Wealthier people do consume more professional RRP services, and they should be expected to absorb the additional costs imposed by the proposed rules. However, inelasticity in the demand for housing does not translate to inelasticity in the demand for professional RRP services. Among many differences is that a person demanding housing has fewer substitutes. A person may buy, rent, or stay with friends or relatives, but few people can be expected to build their own housing in the same way that they might conduct their own renovations, repairs, and painting. Therefore, the elasticity of demand should be greater than EPA suggests, which will lead to more consumers doing things themselves if the cost of professional RRP services is increased.

Additionally, as EPA points out, owners of rental properties are likely to be the most sensitive to the rising price of RRP work. Those landlords renting cheap, dilapidating housing are likely to be most sensitive to rising RRP costs. Not only are these landlords the least likely to be able to bear the additional costs imposed by the proposed regulations, but they are also probably more likely than owners of more expensive properties to be renting older buildings containing deteriorating and/or flaking lead paint. In short, the proposed rules may shift costs onto affluent homeowners and deny benefits to wealthy landlords, but they may also force those in the middle to substitute their own services, while poorer tenants must either do without or improve their living conditions out of their own pockets.

[164] *See Id.* at ch. 3 p. 41.
[165] "Because of the lack of detailed price elasticity estimates for RRP, the analysis in the Chapters 4, 5 and 6 do not incorporate any reduction in professional RRP activities in response to the cost increases resulting from the regulation." *Id*. at ch. 3 p. 43.
[166] *Id.*
[167] *Id.*

In addition to limiting the effects of substitution, EPA further reduced projected costs by assuming the future existence of cheap reliable test kits for lead-based paint.[168] According to the proposed rule, EPA is "confident" that such test kits will likely be available within one year after the initial stage of the rule becomes effective.[169] EPA expects these test kits to cost less than $2, be capable of being conducted with minimal training, and produce results within an hour.[170] This assumption has a significant effect on the predicted costs (the presence of test kits allows EPA to assume that only homes with lead paint problems are subject to the phase 2 requirements of the rule) yet EPA provides little support to indicate that reliable, inexpensive test kits will be available in the near future. Indeed, existing test kits for lead-based paint are notoriously unreliable, with false positive rates ranging from 42 to 78 percent.[171] If EPA were to assume false positive rates this high for Phase 2, for which it only assumes a 10 percent false positive rate,[172] then the number of homes affected by Phase 2 could be from four to nearly eight times higher than anticipated, which would increase costs substantially.

The reliable alternative to test kits is examination by an X-ray fluorescence (XRF) machine. Unfortunately, XRF machines are expensive (between $14,000-$21,000), bulky, and must be handled by a trained professional. According to EPA's Economic Analysis this translates into $100 to $300 cost to test a single room and $300 to $500 for an entire house; these estimates do not include time delays or other opportunity costs for homeowners and RRP workers.[173] The great expense associated with testing for lead-based paint indicates that a market exists for a reliable test kit. Yet, despite the obvious incentive, one has yet to be developed, which raises questions about EPA's optimism that such a cheap, reliable test kit will come into being so soon. EPA points to no evidence that cheap, accurate test kits are on the verge of being introduced, but instead expresses its "confidence" that they can be developed within one year of the rules formal introduction.[174] Based on current evidence, most future testing for lead-based paint is likely to be carried out by $500 examinations by XRF machines, rather than $2 test kits not yet in existence. Thus, the $495 to $649 billion in costs estimated for the implementation of Phase 2[175] is severely understated.

While EPA may have underestimated costs, the several billion dollars in estimated benefits are largely attributed to the gains in earned income that would have otherwise been lost to children with lead-stunted IQs.[176] EPA estimates that the proposed rule will benefit the IQs of between 780,000 to over 1 million children every year (depending upon the compliance rate). Furthermore, the agency anticipates additional health benefits

[168] *See Id*. at ch. 4 p. 37.
[169] 71 FR 1599.
[170] *Id.*
[171] *Id.*
[172] ECONOMIC ANALYSIS, *supra* note 122, at Executive Summary 7.
[173] *Id.* at ch. 4 p. 37.
[174] 71 FR 1599.
[175] These costs assume the 10 percent false positive predicted for the new kits, while the costs associated with Phase I assume a 63 percent false positive rate indicative of currently available test kits. ECONOMIC ANALYSIS, *supra* note 122, at Executive Summary 6.
[176] *Id.* at 7-9.

to roughly four million adults in the form of reduced cardiovascular disease, hypertension, and stroke.[177]

However, the number of benefited children is unlikely be that large. Again, the estimate of the number of children benefited rests on the assumption that homeowners will not substitute much of their work for that of higher priced professionals. The Economic Analysis does not appear to take into account children who might suffer elevated blood-lead levels because necessary renovations are delayed, not undertaken, or performed by their parents.

Moreover, as we have seen from the review of Phases I, II, and the Wisconsin study the connection between RRP work and elevated blood-lead levels is itself questionable. As evidenced by the complete lack of a connection between interior RRP work and elevated blood-lead levels and the similarity of EBL rates in renovated homes built before and after 1980, the most logical source of EBLs (excluding direct ingestion or prolonged exposure to lead-based paint) appears to be the likely ingestion of dirt either contaminated by decades of leaded gasoline pollution or lead-based exterior paint flaking and leaching into the soil. If this is the case, then EPA's proposed renovation, repair, and painting rules will lower the blood-lead of very few children. Lastly, the number of children in the country with elevated blood-lead levels ($\geq$ 10µg/dL) is estimated at 310,000[178] and falling, which raises a question of how a million or more children could benefit annually from the proposed rule.

VI. Recommendations: Complying with the Statute, Maximizing Benefits, and Minimizing Costs

In their current form, EPA's proposed rules on renovation, repair, and painting will impose significant costs on consumers while generating little in the way of health benefits. Indeed, behavioral responses to the regulations could actually result in activities that increase the blood-lead levels of children. With this in mind EPA should consider a range of options that reduce costs and increase benefits, which can be done within the letter and spirit of the statute.

A. Complying with the Statute

Section 403(c)(3)[179] of the Toxic Substances Control Act, as amended by Title X of the Housing and Community Development Act of 1992,[180] directs the Administrator of EPA to promulgate regulations regarding RRP activities in buildings that "create lead-based paint hazards." The statute leaves EPA with little choice but to create a certification program for RRP workers and promulgate the necessary regulations. However, EPA has wide discretion in this matter, and is, of course, entitled to a reasonable interpretation of

[177] *Id.* at 7.
[178] Blood-Lead Levels – United States, 1999-2002, 54 MORBIDITY AND MORTALITY WEEKLY REPORT 9-12 (May 27, 2005).
[179] Codified at 15 U.S.C. § 2682(c)(3).
[180] Pub. L. No. 102-550.

the statute. A reasonable interpretation of the statute is that it commands EPA to create a certification program and promulgate regulations that reduce the creation of lead-based paint hazards and their risks to RRP workers and children.

EPA faces a difficult tradeoff in its statutory mission to reduce the risks of lead exposure. While the assertion is often made that "lead-based paint hazards" result from RRP work, it is definitely true that lead-based paint hazards result from deteriorating and/or flaking paint, which implies that not having RRP work done poses a greater risk than the work itself. With this in mind, EPA must both encourage RRP work to take place but also ensure that it is done responsibly. In short, EPA needs to minimize the costs of its proposed regulations, while maximizing the benefits, which is what any good regulatory policy should aspire to do. If the imposition of high costs deters essential RRP work from taking place, then EPA's proposed rules will have acted more contrary to the intent of the statute than if the agency had done nothing at all.

Before promulgating its final rules on renovation, repair, and painting, EPA should consider the following facts explored in this comment:

1. While prolonged exposure to lead contaminated dust created by deteriorating paint can elevate blood-lead levels, the connection between temporary dust kicked up by renovation and remodeling (RRP) activities is more tenuous. In Phases I and II of its R&R study, EPA failed to find a connection between high levels of lead dust and elevated blood-lead levels in RRP workers. The Wisconsin study revealed a statistically significant relationship between RRP work and elevated blood-lead levels, but the introduction of baseline variables with proven associations to elevated blood-lead, such as income, parents' education, the presence of peeling paint, etc., nullified this correlation. Furthermore, while the Wisconsin study appeared to indicate a connection between exterior painting and elevated blood-lead levels, no such correlation appeared for interior preparation and painting. At the very least, these results do not appear to justify extensive regulations focused on interior renovations.

2. Small firms, who are ill suited to absorb regulatory costs, dominate the renovation and remodeling industry. Furthermore, older people, who are unlikely to have young children, spend the lion's share of the amount of money spent on professional remodelers. The costs of EPA's proposed regulations will first be born by very small businesses, only to be passed on to older homeowners, while any benefits will come nowhere near most small children.

3. About half of all renovation and remodeling work is done by homeowners themselves, and, the younger the homeowner, the more of the work he or she is likely to do it him or herself. Professionals are more likely to be called in for highly specialized work, such as plumbing, roofing, siding, and electrical work, while homeowners are more likely to engage in painting or its preparation. The activities most likely to produce the most dust are those least likely to be performed by professionals. Homeowners engaged in do it yourself projects are less likely to take precautions against a wide range of hazards than are

professional remodelers. Moreover, the introduction of extensive certification and training requirements can only serve to raise the costs of professional services, which might delay much needed renovations, including renovations that remove lead paint, or compel more homeowners to undertake remodeling projects themselves.

4. Prolonged exposure to lead chips and deteriorating paint is of greater concern than any temporary dust kicked up by renovations, which should quickly subside and dissipate through cleaning. Thus, the American Academy of Pediatrics supports renovation: "There is increasing evidence that professional cleaning, paint stabilization, and removal and replacement of building components can interrupt exposure." The proposed rules will inevitably increase the cost of (and reduce demand for) renovation. Given its goal of reducing childhood lead exposure, EPA may wish to consider ways of encouraging renovations and making them cheaper.

With these facts in mind, it is important that EPA consider regulations that minimize costs, while ensuring the protection of children. EPA's research has shown that RRP work does not quite present the "lead-based paint hazard" that was previously believed to exist, and that regulations that promote substitution to do-it-yourself work or postponement of needed repair will either not help or result in greater exposure. In order to best comply with the language and intent of the statute, EPA should consider a simplified certification process that educates RRP workers about lead-contaminated dust, emphasizes the importance of a thorough cleanup, and encourages (or even requires) contractors them to take the time to educate their customers with small children about how they can better protect their loved ones from any potential lead-paint hazards created during RRP work.

B. Simpler, Less-Burdensome, and more Effective Certification Program

Phases I and II of the R&R study demonstrated that RRP activities can generate significant amounts of dust, but that this did not translate into higher blood-lead levels in exposed workers. However, the most important aspects of these studies were that they showed where the dust ended up and how rapidly it diminished after even the most rudimentary of cleanings. A simple, short certification lesson should emphasize these facts. RRP workers should be taught which activities generate the most dust and how far the dust carries from where the work is carrier out. This information should educate RRP workers as to the most effective means of minimizing the amount of dust left after work.

C. Modify Phase 2

EPA's lead requirements would take place in two phases. Phase 1 would generally cover homes built before 1960 where children under 6 reside. These are indeed homes where small children are likely to be exposed to lead paint hazards. Phase 2 would commence one year later and cover "[a]ll renter-occupied target housing built before 1978, and owner-occupied target housing units built before 1978 where a child under the age of six

resides."[181] EPA assumes the cost of Phase 2 will be much less than Phase 1 because of the assumed availability of accurate, low-cost test kits that will allow renovators to target only homes with lead hazards for the increased precautions required by the rule.

If such test kits do not become available within a year, the costs of the proposal will be dramatically higher, without any commensurate increase in benefits. At a minimum, EPA should not impose the Phase 2 requirements until a reliable test kit is actually available on the market.

D. Informing Parents

Renovations can kick up lead dust, but these rises are only temporary and fall soon after. With this in mind, EPA might want to consider taking steps to ensure that renovators and remodelers better inform parents about RRP work and potential lead-paint hazards. Informed and alerted parents would be in an excellent position to decide the best means of minimizing their children's potential exposure. Children could be sent away during renovations, kept from work areas, be instructed to wash their hands and wipe their feet more often, or be taken for blood-lead tests. Studies have shown the effectiveness of basic preventative measures.[182] Steps as simple as persistent washing of children's hands, the removal of shoes before entering the home, or the use of doormats (to catch lead from contaminated soil) have been shown to significantly reduce lead exposure.[183] EPA already mandates that contractors give information to homeowners. Perhaps EPA should focus its attention on improving these warnings, emphasizing simple remedial measures, and improve the likelihood of them being heeded.

EPA has proposed the development of cheap and accurate lead home testing kits to replace the notoriously unreliable ones available today. While home testing kits may be presently unreliable, medical testing is not. Children eligible for Medicaid are entitled to reimbursement for blood lead testing twice—at age one and age two. According to the AAP, most children with elevated blood-lead concentrations are Medicaid eligible, yet most Medicaid eligible children have not been screened.[184] This is one of many important facts that should be better communicated to parents.

E. Federalism Ensures Extra Protections where They are Needed without Imposing Burdens that are Not

The concentration of the number of houses with lead paint is a function of when they were built. Paint manufacturers started reducing the amount of lead in paint during the 1950s and lead free paint was widely available by 1960. The 1978 ban on the manufacture of lead paint certified a moot point, as its use had long since effectively ceased. Accordingly, the distribution of lead paint is unlikely to be uniform across the

[181] ECONOMIC ANALYSIS, *supra* note 122, at Executive Summary 2.
[182] *See* ENVIRONMENTAL PROTECTION AGENCY, REVIEW OF STUDIES ADDRESSING LEAD ABATEMENT EFFECTIVENESS 52-58, 71 (Prepared by Battelle Nov. 20, 1997)
[183] *Id.*; *See also* Moore, *supra* note 28, at 93, 141-142, 150-151.
[184] AAP, *supra* note 5, at 1041.

country. States that have experienced the most growth since the 60s and 70s should have relatively minor lead paint problems, as opposed to those with large numbers of older homes. Therefore, we should find fewer problems in the South and Sunbelt states, than in the Northeast. For example, HUD has found that housing in the Northeast and Midwest has twice the prevalence of lead paint as homes in the South or West. With this in mind, it might be more effective to rely on states to design and implement their own lead renovation programs. The states have typically been better disposed to dealing with lead related issues. For example, in the early 1990s the CDC was considering mandatory blood-lead testing for children. This triggered a full scale revolt from health authorities in Western states who complained that they: (1) probably would find few children with elevated blood-lead levels, and (2) had better things to spend their scant public health money on. The nationwide plan was subsequently abandoned, but, in response to its own needs, New York mandated annual lead blood testing for children under 7 in 1993. As of 1997, when EPA issued its initial lead renovation rules, 20 states covering 45 percent of the population already had their own lead certification programs. Seeing as the relationship between a state and its people is often closer than that of a resident to the federal government and that any lead problems are unevenly distributed across the states, they are perhaps better left to state authorities.

Despite their good intentions, EPA's proposed rules governing renovations and lead dust will delay renovations and lengthen the time that children today spend exposed to peeling or deteriorating paint, as well as other non-lead hazards that more prompt renovation would have otherwise remedied. Fortunately, EPA may achieve its desired ends through less costly and intrusive means. It may be best that EPA adopt a light regulatory approach to this issue and leave more extensive regulation to the states with their divergent lead-paint problems. However, if EPA wishes to take a more active role, then it should focus on improving information about lead dust and educating parents about the simple steps they can take to minimize their children's exposure.

APPENDIX I
RSP CHECKLIST

Element	Agency Approach	RSP Comments
1. Has the agency identified a significant market failure?	EPA has identified the asymmetry of information regarding the presence of lead-based paint as a market failure. **Grade: B**	The asymmetry of information may have given rise to a market failure. However, the certification of RRP workers and the mandating of certain work practices are unlikely to remedy a situation where the market failure is characterized by asymmetric information. Asymmetric information is best alleviated by providing additional information to RRP workers and consumers, not by mandating certification and particular work practices.
2. Has the agency identified an appropriate federal role?	EPA does not discuss the different circumstances faced by different regions of the country. **Grade: C**	Though compelled by statute to pursue RRP certification, EPA should recognize that lead paint hazards are a greater concern in certain regions of the country, where the housing stock is older, and that those states have implemented actions to address the greater risks. The disparities in the nation's lead paint problems support a less burdensome national certification program and prescribe fewer work practices, leaving more rigorous standards to the states, as appropriate.
3. Has the agency examined alternative approaches?	EPA has proposed alternatives to the scope of the rule and raised the possibility of flexible work practices. **Grade: C**	Although EPA has examined the possibility of different options regarding the scope of applicability and the flexible application of work practices, it has not considered options such as allowing states more flexibility or the option of better educating parents, rather than mandating certification and work practices. Further, EPA should consider extending the Phase 2 deadline until cost-effective and reliable test kits are available.

Element	Agency Approach	RSP Comments
4. Does the agency attempt to maximize net benefits?	Although the costs and benefits of the proposed rule are difficult to ascertain, EPA has likely underestimated costs and overestimated benefits. **Grade: C**	EPA has underestimated costs by assuming the rapid development of cheap, accurate test kits. The benefits have also likely been overestimated. The agency estimated the number of children benefiting at between 780,000 and 1 million. This large estimate is based on the assumption that few parents will substitute do it yourself work for professional RRP. The large number is also not in line with the fact that the number of children with elevated blood-lead levels is estimated much lower at— 310,000.
5. Does the proposal have a strong scientific or technical basis?	EPA relied on the conclusion of the Wisconsin study but ignored the real "findings" within the study. **Grade: D**	The Wisconsin study claimed a link between RRP work and elevated blood-lead levels. However, this correlation disappeared when confounding variables were taken into account. Thus, the study does not support the conclusion that RRP increases blood lead levels in children.
6. Are distributional effects clearly understood?	EPA assumed that the demand for RRP work is inelastic and that costs would be passed on to high-end consumers. **Grade: C**	The demand for RRP work is likely not as inelastic as EPA thinks. Homeowners will undoubtedly substitute their own work, delay much need renovations, and may even go without. Not only will RRP workers find less work, but do it yourself work and/or delayed renovations could precipitate more elevated blood-lead levels in children.
7. Are individual choices and property impacts understood?	EPA has not addressed individual choices and property impacts. The agency has assumed the costs will be born by high end homeowners, who will not significantly cut back their consumption of RRP services. **Grade: D**	The proposed rule will deprive some people of the option of professional RRP services because of increased costs. It will also limit choices and impose burdens and costs upon RRP workers and firms.