"GET THE LEAD OUT OF VERMONT"

REPORT OF THE COMMITTEE ON LEAD IN CONSUMER PRODUCTS AND OTHER EXPOSURES

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Consumer Products and Other Exposures
Table of Contents

I. Introduction

A. *Organization of This Report*

Although lead-based paint in housing is the primary source of human exposure to lead in the United States, there are many other exposure sources. These include a wide range of consumer products, environmental sources and occupational settings. This report describes these "other exposures," outlines past and current efforts to reduce them, and recommends appropriate governmental responses.[1]

By "consumer products" is meant the vast array of goods available in the market with which people come into contact. This report specifically discusses children's products, imported cosmetics and folk remedies, food and food vessels, and "other products" (of which seven examples—wheel weights, ammunition and sinkers, salvaged building components, car batteries, non-residential paints and primers, hair and skin care products, and tattoos—are addressed), as well as the issue of "e-waste."

Environmental exposure sources primarily include soil, water and air. Occupational sources are those settings where workers may be exposed to lead, and from which lead may be brought home on body, clothing or otherwise, posing a hazard to family members.

The final sections of this report describe other jurisdictions' legal responses to exposure to lead from non-housing sources and address two broader issues—the "precautionary approach" to environmental health and "persistent bioaccumulative toxins."

B. *Extent and Nature of the Problem*

As a threshold matter, it is worth considering the extent to which sources other than paint in housing contribute to Vermonters' overall exposure to lead. This is a question that cannot be easily answered, but there are reasons to think that non-housing-related sources are of concern. For example, 36% of investigated lead poisoning cases in California in 2000-2002 had at least one lead exposure source other than soil, paint or dust; and between 6% and 14% had only a non-soil/paint/dust source. These cases were identified with occupational take-home exposure (12.5%), home remedies (10.4%), hobbies (5.9%), pottery and ceramics (2.6%), and other sources such as candy and jewelry (9%).[2] In New York City, 35% of children over the age of 3 with elevated blood lead levels (BLLs) were found not to have had an obvious lead paint source.[3] Reflecting the "cultural dimension" of lead exposure from consumer products, another study found elevated BLLs in 40% of refugee children recently arrived from Central America, 27% from Vietnam, 27% from Africa, and 25% from Asia.[4]

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[1] Throughout this report, recommendations for action are indicated by a circular bullet (•).

[2] J. G. Courtney, Calif. Dept. of Health Services, Childhood Lead Poisoning Prevention Branch, Presentation to Border States Lead Issues Meeting, El Paso, Texas, Jan. 26, 2006 (PowerPoint).

[3] New York City Dept. of Health and Mental Hygiene, Childhood Lead Poisoning Prevention Program, *Annual Report 2003* (Dec. 2004), 6, http://www.nmic.org/nyccelp/medical-studies/DHMH-lead-2003report.pdf. (Internet websites cited in this report were operational as of at least July 1, 2006.)

[4] P. Geltman, M.J. Brown and J. Cochran, Lead Poisoning Among Refugee Children Resettled in Massachusetts, 1995-1999, 108 *Pediatrics*, 158-162 (2001).

Nonetheless, such aggregate data are rare. More common are product-specific reports of exposure to lead from other sources. One useful compilation is available from the Centers for Disease Control and Prevention ("CDC"), in an appendix of "less common" causes of elevated BLLs, which lists 44 documented non-housing exposure sources, including occupational take-home exposures (battery reclamation, ceramics, furniture refinishing, construction and radiator repair), cosmetics imported from South Asia and other parts of the world, contaminated foods, beverage containers, folk remedies from Asia and the Middle East, and miscellaneous sources (key chain emblems, a clothing accessory, curtain weights, fishing sinkers, gasoline sniffing, lead ammunition, a toy boat keel, a fireplace log, pool cue chalk and vinyl miniblinds).[5] A similarly wide range of other exposures has also been described by the Agency for Toxic Substances and Disease Registry.[6]

Information on other exposures is set out below by source category. Quantities within source category are also worth noting: as stated in the section on children's products, the number of individual product units recalled by the Consumer Product Safety Commission (CPSC) just between January 1, 2005, and April 20, 2006, exceeded 12.5 million. The death of a four-year-old in Minnesota in February 2006 from lead poisoning caused by swallowing a piece of jewelry composed of 99% lead[7]—while an unusually tragic outcome—likewise suggests that non-housing exposures are a cause for concern.

C. First Principles

In addressing non-housing exposures, at least five "first principles" should be taken into account:

- *There is no safe level of lead exposure.* While governmental regulatory approaches typically trigger public action on a finding that a person's (commonly, a child's) BLL exceeds a specified threshold,[8] according to the CDC "there is no safe level of lead in blood"—a position with which the EPA concurs.[9] Of particular concern is evidence of neurobehavioral deficits in children associated with very low BLLs.[10]

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[5] CDC, *Managing Elevated Blood Lead Levels Among Young Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention* ("CDC, *Managing Elevated Blood Lead Levels*"), App. I, Published Reports of Less Common Causes of Elevated Blood Lead Levels (EBLLs) in Children, http://www.cdc.gov/nceh/lead/CaseManagement/CaseManage_appendixes.htm.

[6] Agency for Toxic Substances and Disease Registry ("ATSDR"), *Draft Toxicological Profile for Lead* (Sept. 2005) ("*Profile*"), ch. 6, http://www.atsdr.cdc.gov/toxprofiles/tp13.pdf .

[7] The jewelry was a metal charm marketed as a free gift with Reebok children's footwear. *See* Minnesota Dept. of Health, Lead Poisoning Prevention, *Child Dies of Lead Poisoning from Metal Charm* (Mar. 23, 2006), www.health.state.mn.us/divs/eh/lead/topics/braceletrecall.html. The same day that the CPSC recalled 300,000 of the charm bracelets, http://www.cpsc.gov/cpscpub/prerel/prhtml06/06118.html, the agency also recalled 580,000 Dollar Tree jewelry products that contained high levels of lead, http://www.cpsc.gov/cpscpub/prerel/prhtml06/06118.html.

[8] *See, e.g.,* 18 V.S.A. § 1757(b) (if child is found to have blood lead level equal to or greater than 20 micrograms per deciliter [μg/dL] and is thus "severely poisoned," Commissioner of Health must inspect child's housing and take other specified action). Federal laws, regulations and policies involving similar "triggers" are discussed throughout this report.

[9] CDC, *Lead: Questions & Answers*, http://www.cdc.gov/lead/qanda.htm; EPA, *Measure S2: Lead-contaminated Soil Near California's Public Elementary Schools*, http://www.epa.gov/envirohealth/children/features/s2.htm ("Current research shows there is no safe level of lead in blood."); *see also Profile* (note ["n."]6),

- *Lead is bioaccumulative.* Lead accumulates in the body over time and from multiple sources.[11] Thus, the fact that a particular non-housing exposure source fails to cause a BLL elevated above a specified threshold does not mean that the exposure is without significance beyond its own effects, for it may be augmented by one or more later exposures to housing or non-housing sources of lead. Moreover, elemental lead in products and the environment does not break down over time but persists[12] and once released is difficult to recapture.

- *Children are particularly vulnerable to lead exposure.* It is well established that children, especially children under the age of six, are adversely affected by lead exposure to a much greater degree than older children and adults.[13]

- *To the extent that it is feasible, steps should be taken to* prevent *exposure to lead from any source, rather than to react to findings of lead in children's blood.* When public action is triggered as a matter of law by specific BLLs, the subjects of the testing regime (typically children) serve as "canaries in the mine." An alternative and preferred approach, if feasible, is to identify sources of lead exposure ahead of time and take steps to reduce or eliminate those sources of lead before exposure occurs. Each category of exposure must be evaluated in terms of this balance between prevention and feasibility, including the impact of the source on young children, the technical ability to affect the source, the costs of reducing the source, and the greater or lesser importance to society of the source as presently constituted.

- *Consumer education and the "right to know" are not sufficient in and of themselves to prevent exposure to lead.* While educating consumers and/or mandating a public right to know of the existence of lead from a particular source can be part of an overall lead prevention strategy, such strategies are not alone sufficient to affect consumer behavior in major ways. Among the obstacles to effective health warning programs are limitations on Americans' tendency to seek information, and the common disconnect between awareness of risk and action based on that awareness.[14] It is particularly inappropriate to rely exclusively on such measures to protect children from serious risk to health, given children's ultimate inability to protect themselves.

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25 ("[N]o threshold for the effects of lead on IQ has been identified.") and 30 ("[The] data suggest that certain subtle neurobehavioral effects in children may occur at very low [BLLs].").

[10] *Profile*, 23, 97 *et seq.* ("In fact, the results of some recent studies suggest that there may be no threshold for the effects of lead on intellectual function.").

[11] *Ibid.*, 278 (describing lead's "persistence, bioaccumulative nature, and toxicity").

[12] *Ibid.*, 4.

[13] *See, e.g., ibid.*, 24 ("Lead can impair cognitive function in children and adults, but children are more vulnerable than adults. ... [T]he developing nervous system is especially susceptible to lead toxicity."), 198 *et seq.* Moreover, prenatal exposure to lead has harmful effects on brain development that produce lasting behavioral deficits, as has been shown in disturbances of normal neonatal behavior when cord blood lead levels are high during pregnancy. A.B. Patel, M.R. Mamtani, T.P. Thakre and H. Kulkani, Association of umbilical cord blood lead with neonatal behavior at varying levels of exposure, 2 *Behavioral and Brain Functions* (2006), http://www.behavioralandbrainfunctions.com/content/2/1/22.

[14] B. Nordenstam and J. DiMento, Right-to-Know: Implications of Risk Communication Research for Regulatory Policy, 23 *U.C. Davis L. Rev.* 333, 353, 357 (1990); *see also* C. Rechtschaffen, The Warning Game: Evaluating Warnings Under California's Proposition 65, 23 *Ecology L. Q.* 303, 307 (1996) (finding California's warning requirement for products or activities that expose persons to toxic chemicals to have been "largely ineffective in promoting informed choice," but recommending ways of improving warnings).

D. Approaches to Reducing or Eliminating Lead Exposure

1. Consumer products

There are various legislative and regulatory means available to reduce human exposure to lead used in the manufacture of consumer products. The Committee starts from the premise that any human exposure to lead can cause potentially significant harm to the human body. Therefore, the policy goal should be to eliminate exposure to lead as comprehensively and quickly as possible. To that end, a "tiered" approach is appropriate, based primarily on the necessity or value of the product and the current availability of alternatives to lead. Other factors to be considered include cost and the potential for harm if no action is taken.

Any regulatory approach should begin with an identification of products currently being manufactured that are known or suspected to contain lead. These products should then be classified by appropriate regulatory mechanism, including (1) an immediate prohibition, (2) a phase-out over a period of years, (3) a phase-out with a trigger mechanism (such as a requirement that neighboring states with a certain aggregate population pass a similar restriction), or (4) a warning label in cases where prohibition or phase-out is not possible.

Products classified as appropriate for an *immediate prohibition* include those that pose a risk of significant exposure to children and that are either of limited necessity to the economy or society, or have ready substitutes that do not contain lead. An immediate statutory prohibition might read, "Effective immediately, the following products may not contain any measurable amount of lead and be manufactured or sold in Vermont."

A *phase-out* assumes that the product has some importance to the economy or society, and that an alternative to lead is possible but perhaps not yet widely available. The phase-out approach is sometimes referred to as "technology forcing." Under this approach, the length of time allowed before lead is phased out can vary depending on the perceived viability and affordability of alternatives. A statutory phase-out might read, "Effective [date], ... the following products may not contain any measurable amount of lead and be manufactured or sold in Vermont."

A *phase-out with trigger* recognizes that as a single state, Vermont is not large enough to shape the national marketplace. By acting first with this approach, Vermont can provide leadership without assuming the risk of acting alone. A statutory phase-out with trigger might read, "The standards pertaining to [a product] shall not take effect until equivalent or higher standards regarding lead in [that product] have been adopted by and have taken effect in one or more New England states in addition to Vermont and in at least one of the following states: [list other states, such as New York, Pennsylvania and New Jersey]."

Finally, there may be some necessary products for which lead simply is critical and there are as yet no known alternatives. Yet there may still be some value in alerting consumers to the presence of lead in these products, to reduce the potential for exposure during the use of the product and/or ensure proper disposal. A *warning label* may be appropriate in such cases.

2. *Other approaches*

There are several strategies for reducing or eliminating lead exposure, or for protecting citizens from the risk of such exposure, that do not involve a prohibition, phase-out or labeling, and that are not limited to exposures from consumer products. These approaches are listed below as "mega-recommendations," applicable to most types of non-housing exposures. They are incorporated by reference throughout the report and thus do not appear as specific recommendations in connection with particular exposure sources. They include the following:

- Work together with other states' Childhood Lead Poisoning Prevention Programs, especially those in New England, to develop materials and ideas for action.
- Work with other states to identify and deter U.S. and foreign manufacturers of consumer products containing lead.
- Reach out to distributors and retailers of consumer products to encourage them to sell only lead-free products.
- Ensure that recall notices about lead in children's products are widely available to residents of Vermont.
- Undertake outreach efforts to educate Vermont consumers as to sources of exposure to lead and how to avoid them.
- Initiate an adult lead surveillance system so that the results of BLL testing in adults are reported to a central repository.
- Continue to identify and prioritize lead-containing products and assign appropriate regulatory approaches to each.

II. Consumer Products

A. Children's Products

Although the presence of lead and lead-based paint is regulated (though not banned from use) in children's products in the United States, those substances are still used in the manufacture of some children's products abroad. Lead may be the primary component in these products, as in some children's jewelry, or it may appear as lead-based paint to coat the surface.

A review of voluntary lead recalls listed on the Consumer Product Safety Commission (CPSC) website for January 1, 2005, through April 20, 2006, shows 17 recalls of children's products. Ten recalls involved jewelry—pendants, bracelets, necklaces, rings and charms. The other six recalled items included children's painted fishing poles, animal-shaped flashlights, cribs with lead-based paint, key rings, sunglasses and a floor mat map game. It is worth noting that the number of individual units recalled was substantial: 10.6 million items of jewelry, and almost 12.6 million items of all types. How many other products with lead were on the market during this period of time is, of course, unknown.

Recalls of Children's Products from CPSC, January 1, 2005-April 20, 2006[15]

Date	*Product*	*Approx. #*
March 2006	American Girl Children's Jewelry (division of Mattel)	180,000
March 2006	Reebok heart-shaped charms	300,000
March 2006	Dollar Tree mood necklace and ring, Glow in the Dark necklace and ring, and UV necklace and ring	580,000
March 2006	Oriental Trading Company beaded photo charm bracelets	25,000
March 2006	Little Tikes animal-shaped flashlights sold at Target	20,000
February 2006	Accentz™ Changlz™ metal charms	29,000
November 2005	Metal necklaces and zipper pulls (Stravina Operating Co. of CA)	6 million
November 2005	Delta Enterprise Lov's "Europa" Natural Color cribs: lead in paint	335
September 2005	Dollar General costume jewelry	455,000
September 2005	Disney princess bracelet keyrings	145,000
September 2005	Disney red sunglasses: lead in red paint	12,900
August 2005	Floor mat map games (Map Tangle World Edition): lead in orange paint	140
June 2005	Children's fishing kits: lead paint on pole (dist: Shakespeare Fishing Tackle)	438,000
May 2005	Dollar General heart-shaped pendants	80,000
April 2005	Children's fishing pole: lead paint on pole (Bradley/Zebco)	1.5 million
March 2005	"Charming Thoughts" metal charms (Hirschberg, Schutz & Co. of NJ)	2.8 million
January 2005	Metallic costume bracelets (Riviera Trading Co. of NYC)	7,100
	Total (total of jewelry items only: 10,601,100)	12,572,475

The CPSC is the primary federal agency designated to safeguard children and others from lead in consumer products. Its regulatory authority for lead derives from the Consumer Product Safety Act (CPSA) and the Federal Hazardous Substances Act (FHSA).[16]

Under the CPSA, the CPSC is empowered to issue consumer product safety standards, and to declare a product a "banned hazardous product" if it presents an unreasonable risk of injury and no feasible safety standard would adequately protect the public from that risk.[17] It is a violation of the CPSA to manufacture for sale, offer for sale, distribute in commerce or import into the United States any consumer product which does not conform to a CPSC standard or which has been declared a banned hazardous product.[18]

Under the FHSA, the CPSC may declare a substance or mixture of substances to be a "banned hazardous substance" if it is either (a) a toy or other article intended for use by children that is or contains a hazardous (including toxic) substance that is "susceptible of access by a child to whom such toy or other article is entrusted," or (b) a hazardous substance intended for household use which is determined by regulation to be a "banned hazardous substance" because public health and safety can only be protected by keeping the substance out of

[15] Recalls are listed by month at http://www.cpsc.gov/cpscpub/prerel/prerel.html.
[16] 15 U.S.C. §§ 2051-2084 and 15 U.S.C. §§ 1261-1278, respectively.
[17] 15 U.S.A. §§ 2056 and 2057.
[18] 15 U.S.A. §2068(a).

commerce.[19] The FHSA authorizes the CPSC to require manufacturers, distributors or dealers to provide appropriate notice to the public, and to repair, replace or provide a refund for banned hazardous substances.[20] If a product contains a lead hazard but is not intended for children, it may require precautionary labeling.[21]

The CPSC has, by regulation, banned paint and similar surface coatings intended for consumer use containing in excess of 0.06% lead by weight, banned toys and other articles for use by children with lead-containing paint, and banned furniture for consumer use with lead-containing paint.[22] In addition, the agency has identified a number of products—some intended for use by children and some not—that have presented a risk of lead poisoning from sources other than paint, such as vinyl miniblinds, crayons, figurines used as game pieces, and children's jewelry.[23]

The CPSC works with other federal agencies, including the Food and Drug Administration (FDA), on the issue of lead in products.[24] For some products, the CPSC and the FDA have jurisdiction over different parts of the product. In the case of a drinking glass, for instance, the CPSC has jurisdiction over the outside of the glass where one would hold it, but the FDA has jurisdiction over the lip of the glass, the inside, and the outside where a person's lip would touch the glass. The same is true for lunchboxes: the CPSC has jurisdiction over the outside and the FDA over the inside.[25]

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[19] 15 U.S.A. § 1261(q).

[20] 15 U.S.A. § 1274(a) and (b).

[21] 15 U.S.A. § 1261(p); CPSC, *Guidance for Lead (Pb) in Consumer Products*, 16 C.F.R. § 1500.230, http://www.cpsc.gov/BUSINFO/leadguid.html ("*Guidance for Lead*"). According to *Guidance for Lead*, if a product is a hazardous substance and is also a children's product, it is banned; if it is a hazardous household substance but is not intended for use by children, it requires precautionary labeling. The CPSC considers eight major factors when deciding if a product is hazardous due to lead content: the total amount of lead contained in a product, the bioavailability of the lead, the accessibility of the lead to children, the age and foreseeable behavior of children exposed to the product, the foreseeable duration of the exposure, the marketing of the product, the patterns of use and the life-cycle of the product.

[22] 16 C.F.R. §1303.

[23] *Guidance for Lead* (n.21).

[24] This is not to say that the agencies always agree with one another. In July 2006, the FDA sent a letter to manufacturers and suppliers of soft vinyl lunchboxes urging them to refrain from marketing their products because testing by the CPSC showed that small amounts of lead could leach from interior polyvinyl chloride (PVC) linings, potentially migrating to food. FDA, Center for Food Safety and Nutrition, Letter to Manufacturers and Suppliers Concerning the Presence of Lead in Soft Vinyl Lunchboxes (July 20, 2006), http://www.cfsan.fda.gov/~dms/pbltr2.html. (Lunchbox manufacturers Fast Forward and InGEAR had already agreed to eliminate their use of interior PVC. California Center for Environmental Health, *New York Company Recalls Lead-Tainted Lunchboxes* (Press Release, Nov. 29, 2005), and *Leading Manufacturer to Eliminate Lead Risks from Children's Lunchboxes* (Press Release, Feb. 15, 2006), http://www.cehca.org/news.htm#PR021506.) By contrast, the CPSC declined to take action based on what it called "the extremely low levels of lead" found. Caroline Mayer, FDA Demands Lead-Free Lunchboxes, *The Checkout* (July 24, 2006), http://blog.washingtonpost.com/thecheckout/2006/07/lead_lunchbox_update.html.

[25] J. Matheson, Ph.D., *Childhood Lead Poisoning Prevention 2010 and Beyond*, April 4-7, 2006, (CPSC presentation at the Spring 2006 Partnership Conference, Newport, Rhode Island, cosponsored by the CDC and the New England Lead Coordinating Committee).

Other federal agencies with which the CPSC works closely are the Environmental Protection Agency (EPA), the Department of Housing and Urban Development, and U.S. Customs and Border Protection (which has refused or detained cross-border shipments of children's products).[26] In an effort to stem the importation of products manufactured with lead in other countries, the CPSC has entered into Memoranda of Understanding with China, Korea, India and Mexico.[27]

Two bills on lead in children's products that are currently pending in Congress—although perhaps not now likely to be enacted—are H.R. 668, sponsored by Representative Henry Waxman, and S. 2048, sponsored by Senator Barak Obama. Both measures would direct the CPSC to ban any consumer product marketed for use by children under the age of six, or whose substantial use by such children is foreseeable, that contains more than "trace amounts" of lead as determined by the CPSC. The bills would also bring into greater harmony public policy (which now permits certain amounts of lead in children's products and in jewelry) and science (which recognizes that there is no safe level of lead).[28]

On the state level, California has taken steps to eliminate lead risks from children's jewelry. On January 27, 2006, the state Center for Environmental Health announced a legal settlement with 71 companies that agreed to "take swift action to end sales of lead-containing jewelry in California by reformulating their products."[29] Signatories to the agreement included Target, Kmart, Macy's, Nordstrom's, Claires, Mervyns, Sears, Toys R Us and Disney. Not included in the agreement were Wal-Mart, Jordache, Cornerstone Apparel (Papaya stores), The Gerson Company, and Royal Items.[30,31]

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[26] *Ibid.*

[27] These Memoranda are available at http://www.cpsc.gov/cpscpub/prerel/prhtm104/04124mou.html (China), http://www.cpsc.gov/cpscpub/prerel/prhtml06/06087.html (Korea), http://www.cpsc.gov/cpscpub/prerel/prhtml06/06066.html (India), and http://www.cpsc.gov/cpscpub/prerel/prhtml06/06045.html (Mexico).

[28] In April 2006, the Sierra Club petitioned the CPSC and EPA to lower the amount of lead permitted in toy jewelry and to convert current voluntary guidance on the subject into an enforceable rule. The petition cited the conflict between the CPSC's policy, which is based on a BLL of concern of 10 μg/dL, and evidence of serious health effects on children at lower levels. *Citizen Petition to CPSC and EPA Regarding Lead in Consumer Products, Especially Toy Jewelry*, http://www.sierraclub.org/toxics/Sierra_CPSC_ TSCA_Petition_4_17_2006.pdf. The Sierra Club's petition was denied by the EPA in July 2006, 71 Fed. Reg. 42640 (July 27, 2006); the Sierra Club has sued the EPA over the issue. In December 2006, the CPSC voted to undertake rulemaking with respect to lead in toy jewelry. CPSC, *Petition for Ban on Lead Toy Jewelry, Petition HP 06-1, Advance Notice of Proposed Rulemaking* (Dec. 4, 2006), http://www.cpsc.gov/LIBRARY/FOIA/ballot/ballot07/leadanpr.pdf.

[29] Center for Environmental Health, Press Release, *Major Retailers Agree to Eliminate Lead Risks for Children's Jewelry* (Jan. 27, 2006), http://www.cehca.org/jewelry.htm.

[30] Some helpful readings on the topic of children's products that present a lead hazard include CPSC, *CPSC Announces New Policy Addressing Lead in Children's Metal Jewelry*, Release #05-097 (Feb. 3, 2005), http://www.cpsc.gov/cpscpub/prerel/prhtml05/05097.html; CPSC, *Interim Enforcement Policy for Children's Metal Jewelry Containing Lead*, http://www.cpsc.gov/BUSINFO/pbjewelgd.pdf (Feb. 3, 2005); CPSC, *Target Corporation Announces Recall of Multicolored Sidewalk Chalk*, Release # 04-032 (Nov. 13, 2003), http://www.cpsc.gov/cpsc/prerel/prhtml04/04032.html; and CPSC, *CPSC Announces Recalls of Imported Crayons Because of Lead Poisoning Hazard*, Release # 94-055 (Apr. 5, 1994), http://www.cpsc.gov/cpscpub/prerel/prhtml94/94055.html.

[31] The problem of lead-contaminated toys continues. In August 2006, a Wisconsin company recalled thousands of bendable cat and dog toys coated with paint containing over four times the federally-allowed amount of lead.

Although there is no comprehensive legislation in Vermont targeting lead in consumer products, there is a statute directed at prohibiting "unsafe children's products"; under this law, a product is deemed unsafe if it meets one of three criteria.[32] However, the statute relies primarily on the actions and standards of others—the CPSC or the product's manufacturer, distributor or importer—and, under current federal standards incorporated by reference, does not constitute an outright prohibition.

Recommendations

- Prohibit the marketing or sale of children's products containing any amount of lead.
- Prohibit businesses from removing lead warning labels that are placed on products in other states (such as in California under Proposition 65).

> ***The Case of Lead in Jewelry***
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> On February 22, 2006, a four-year-old Minneapolis child died of lead poisoning after swallowing a metal charm composed of 99% lead. According to the Minnesota Department of Health, the child's BLL was 180 μg/dL—9 times the "serious poisoning" level specified in Vermont's lead in housing law. The charm was attached to a bracelet sold with Reebok children's shoes. The following month, the CPSC recalled 300,000 of the charms, as well as another 580,000 "Dollar Tree" jewelry items containing high levels of lead.[33]
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> While a death due to lead poisoning is very rare, the presence of lead in jewelry is not. A 2004 study[34] reported that of 311 pieces of jewelry purchased from a variety of retail stores in California, 123 contained more than 50.0% lead by weight, and 36 more than 75.0%. About 70% of the pieces produced "wipes" with at least 1.0 μg/day of lead (double the California Proposition 65 warning level for a child age 3 or younger per 20-second contact). Stated the authors of the report, "This research clearly shows that lead in low-cost jewelry is a significant threat to public health."
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> California's 2006 legal settlements with retailers of low-cost jewelry may diminish the prevalence of lead in this type of product; but as the Minnesota poisoning illustrates, the problem has not gone away. When one weighs the risk to children's health of lead in jewelry against the benefit of including the toxin in these products, it is difficult to reach any conclusion other than that the items should be banned from the marketplace entirely.

The Chinese-made toys had been purchased by libraries in as many as 41 states and awarded to student readers. R. Weller, Company Recalls Library Toys Nationwide Because of Lead Contamination, *First Coast News*, http://www.firstcoastnews.com/money/onyourside/news-article.aspx?storyid=62966.

[32] Title 9 V.S.A. § 2470b ("Unsafe children's product; prohibition"); § 2470b(a)(1-3) (children's product considered to be unsafe if it does not conform to all federal standards, including standards endorsed or established by CPSC and American Society for Testing and Materials; if it has been recalled for any reason by a federal agency or product's manufacturer, distributor or importer, and recall has not been rescinded; or if a federal agency has issued a warning that product's intended use constitutes a safety hazard, and warning has not been rescinded).

[33] *See* sources cited at n.7.

[34] R.P. Maas, S.C. Patch, T.J. Pandolfo, J.L. Druhan and N.F. Gandy, Lead Content and Exposure from Children's and Adult's Jewelry Products, 74 *Bull. Environ. Contam. Toxicol.*, 437-444 (2005).

B. Imported Cosmetics and Folk Remedies

Certain imported cosmetics, primarily used by specific immigrant, migrant and refugee groups, and certain folk remedies arriving from a wide range of foreign countries and primarily used by natives of those countries, are well-known sources of lead exposure. The CDC has compiled an annotated list of such products, which is set out in tabular form in *Managing Elevated BLLs Among Young Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention* (March 2002) (*"EPA Recommendations"*), the relevant portion of which is reproduced below.[35]

Imported Cosmetics

Product	*Description*	*Code*	*Documentation*
Kohl (Middle East, India, Pakistan, some parts of Africa)	A gray or black eye cosmetic applied to the conjunctival margins of the eyes. Can contain up to 83% lead. It is believed to strengthen and protect the eyes against disease.	E	A study of 538 girls aged 6 to 12 years demonstrated that the application of kohl was associated with higher BLLs.
Pakistani eye cosmetics	Eye cosmetics are often applied to the eyes of children.	E	Retrospective chart review of 175 children aged 8 months to 6 years showed an average BLL of 4.3 μg/dL for Pakistani/Indian children not using eye cosmetics and 12.9 μg/dL for those using eye cosmetics.
Surma (India)	Black fine powder applied to the eyes for medicinal and cosmetic reasons.	E	A case-control study of 62 children demonstrated higher BLLs in children using surma.

Folk Remedies

Azarcon	Also known as alarcon, coral, luiga, maria luisa, or rueda. Bright orange powder used to treat empacho (an illness believed to be caused by something stuck in the gastrointestinal tract, resulting in diarrhea and vomiting). Azarcon is 95% lead.	E	Report of 15-month-old and 3-year-old siblings who expired with seizures and a subsequent survey of 545 systematically selected households for azarcon and greta usage.
Ayurvedic medicine (Tibet)	Unnamed traditional medicine.	CR	Single case.
Ba-Baw-San (China)	Herbal medicine used to treat colic pain or to pacify young children.	E	Study of 319 children aged 1 to 7 years demonstrated that consumption was associated with increased BLLs.
Bint Al Zahab (Iran)	Rock ground into a powder and mixed with honey and butter given to newborn babies for colic and early passage of meconium after birth.	CR	Report of 6 children aged 2 days to 3 months.
Bint Dahab (Saudi Arabia)	Yellow lead oxide used by local jewelers and as a home remedy.	CR	Report of 10 children aged 7 days to 13 months, including 3 who took bint dahab.

[35] The table is Appendix I: Published Reports of Less Common Causes of Elevated Blood Lead Levels (EBLLs) in Children, 118, 120–122. References have been edited to include only those related to imported cosmetics and folk remedies; "CR" stands for case report, and "E" for epidemiological study. The table and accompanying citations is available at http://www.cdc.gov/nceh/lead/CaseManagement/CaseManage_appendixes.htm.

Bokhoor (Kuwait)	Traditional practice of burning wood and lead sulphide to produce pleasant fumes to calm infants.	CR	Report of 4 children aged 16 days to 4.5 months.
Ghasard	Brown powder used as a tonic to aid in digestion.	CR	Report of a 9-month-old child who died.
Greta (Mexico)	Yellow powder used to treat empacho (see azarcon); can be obtained through pottery suppliers, as it is also used as a glaze for low-fired ceramics. Greta is 97% lead.	E	See azarcon.
Jin Bu Huan (China)	Herbal medicine used to relieve pain.	CR	Report of 3 children aged 13 and 23 months and 2.5 years.
Pay-loo-ah (Vietnam)	Red powder given to children to cure fever or rash.	CR	Report of a 6-month-old child.
Po Ying Tan (China)	Herbal medicine used to treat minor ailments in children.	CR	Report of a 4-month-old child.
Santrinj (Saudi Arabia)	Amorphous red powder containing 98% lead oxide used principally as a primer for paint for metallic surfaces, but also as a home remedy for "gum boils" and "teething."	CR	Report of 10 children aged 7 days to 13 months, including 7 who took santrinj.
Surma (India)	Black powder used as a cosmetic and as teething powder.	E	A case-control study of 62 children demonstrated higher BLLs in children using surma.
Tibetan herbal vitamin	Used to strengthen the brain.	CR	Report of a 5-year-old child.
Traditional Saudi medicine	Orange powder prescribed by traditional medicine practitioners for teething; also has an antidiarrheal effect.	CR	Report of 3 children aged 11, 22 and 44 months.

The above list provides a snapshot and is not all-inclusive. For example, a remedy not included on the list led to severe BLLs in Hispanic twins in Rhode Island in May 2003. The twins' grandmother had brought an antiperspirant called litargirio from the Dominican Republic. At the outset of this case, it was thought that lead-based paint was causing the elevated BLLs; but when the BLLs continued to rise after remediation, the investigation continued and lead was discovered in the litargirio.[36]

Currently, Vermont has a small but growing population of immigrants, migrants and refugees. In the case of Mexican farm workers, the state does not have good data on how many children may have accompanied their parents to the state. There are better data available about the refugee population, and the Department of Health works closely with Vermont Refugee Resettlement to ensure that refugee children are tested for lead when they enter Vermont and that follow-up testing is done.[37]

[36] CDC, Lead Poisoning Associated with Use of Litargio, 54 *Morbidity and Mortality Weekly Report* ("*MMWR*"), 227–229 (Mar. 11, 2005). All regular issues of *MMWR* are available at http://www.cdc.gov/mmwr/.

[37] One objective under the Vermont Department of Health's (VDH's) Refugee Preventive Health Grant from the Administration for Children and Families is to screen for lead poisoning all refugee children between the ages of 1 and 6.

Recommendations

- Publicize the dangers of imported cosmetics and remedies and continue to monitor other states' experience with them as a lead hazard.
- Ensure that social service and other agencies working with special populations are aware of these lead poisoning sources.
- Collect aggregate data on the population of Mexican farm workers in Vermont and their use of products that may contain lead.
- Continue to work closely with Vermont Refugee Resettlement and similar programs.

C. Food and Food Vessels

The federal regulatory agency for food and food vessels is the FDA. The FDA has not set specific limits for lead in food, but it has established a "provisional total tolerable intake level" (PTTIL) of 6 μg/day for infants and children and 25 μg/day for pregnant women.[38] The agency has also considered taking regulatory action based on a "specification" for lead contained in the Food Chemicals Codex, a compendium published by the National Academy of Sciences.[39] For substances that are generally regarded as safe (GRAS), like salt and sugar, the specifications in the Codex are viewed as setting forth "appropriate food grade" in keeping with 21 C.F.R. § 182.1(b)(3); for example, salt or sugar not complying with a Codex specification may be deemed by the FDA not to be GRAS.[40]

Certain Mexican candies are known sources of lead. The candy may become contaminated in a variety of ways. Some popular chili candy contains lead from soil that has not been properly washed away, and at times from solder in the mill.[41] In one case, lead in ink on the outside of the candy wrapper was not properly separated from the product and leached into the candy.[42] In another case, tamarind candy was found to have been packaged in pots with lead glaze, endangering both potter and consumer.[43] In June 2006, the State of California

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[38] 58 Fed. Reg. 33860, 33865 (June 21, 1993). A PTTIL of 75 μg/day for adults has been proposed. C.D. Carrington and P.M. Bolger, An Assessment of the Hazards of Lead in Food, 16 *Regulatory Toxicology & Pharmacology* 265, 269-270 (1992).

[39] Committee on Food Chemicals Codex, Food and Nutrition Board, Institute of Medicine of the National Academies, *Food Chemicals Codex* (5th ed. 2004). In 1995, the FDA issued a letter to manufacturers, importers and distributors of imported candy and candy wrappers, stating that it would consider taking regulatory action against candy with lead levels above the Codex's 0.5 ppm level for sugar, the main ingredient in many candy products. The Codex subsequently reduced its specification for lead in sugar to 0.1 ppm. FDA, *Supporting Document for Recommended Maximum Level for Lead in Candy Likely To Be Consumed Frequently by Small Children* (Dec. 2005) ("*Candy Document*"), note 1, http://www.cfsan.fda.gov/~dms/pbcandy.html.

[40] Email from Dr. Michael E. Kashtock, Center for Food Safety and Applied Nutrition, to Elliot Burg (June 22, 2006). The Committee on Food Chemicals Codex states that "[a]lthough diet is not the largest source of lead exposure, it is a significant one," and that its policy is "to reduce lead and other heavy metals limits to the lowest extent feasible, especially given that more recent evidence shows deleterious neurobehavioral effects occurring in children exposed to lead at levels below those previously considered acceptable." *Codex*, 3.

[41] V. Godines and J.B. McKim, Toxic Treats—The Chili Fields, *The Orange County Register* (part 2, Apr. 26, 2004), http://www.ocregister.com/investigations/2004/lead/part2.shtml.

[42] Conference call with Dr. Michael E. Kashtock, FDA, and members of the Committee on Lead in Consumer Products and Other Exposures ("the Committee"), Apr. 13, 2006 ("Kashtock").

[43] V. Godines and J.B. McKim, Toxic Treats—Poisoned Packages, *The Orange County Register* (part 4, Apr. 28, 2004), http://www.ocregister.com/investigations/2004/lead/part4.shtml.

reached a settlement with three major candy manufacturers to reduce the levels of lead found in "Mexican style" candies.[44, 45]

In December 2005, the FDA distributed for public comment a guidance document on lead in candy likely to be consumed by small children.[46] It sets a maximum lead level in candy likely to be consumed by children not to exceed 0.1 ppm. The guidance indicates that such a level would not pose a significant risk to small children and should be achievable with good manufacturing practices. A supporting document presents the background and rationale for FDA's recommended maximum lead level for such candy.[47] One group, the Environmental Health Coalition, has taken issue with the guidance document, stating that the 0.1 ppm standard is not sufficiently stringent.[48]

The presence of lead in candy is not confined to candies targeted at young children. On March 31, 2006, Dagoba Organic Chocolate recalled six of its dark chocolate products because they contained high levels of lead.[49] The company traced the lead to the facility where beans used in the recalled products were processed.[50]

A Case of Lead in Candy

In August 2000, a Hispanic boy aged 4 years residing in Los Angeles County was identified through routine screening by California's Medicaid program with a BLL of 22 μg/dL. When the child was tested at age 1 year, he had an acceptable BLL of 5 μg/dL. Family members reported that he had been eating Mexican candies regularly for 3 years but denied the use of folk remedies or imported pottery. An environmental investigation of their apartment, which was built in 1986, did not reveal high lead levels. The child was born in the United States and had not traveled to Mexico, and investigators identified no other potential sources of lead other than the Mexican candies. The family was advised not to allow the child to eat Mexican candies. By December 2001, the boy's BLL had decreased to 11 μg/dL.[51]

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[44] Office of the California Attorney General, *Attorney General Lockyear Announces Settlement with Hershey and Mars Subsidiaries To Reduce Lead In Mexican Candy Popular with Children, Landmark $954,000 Settlement Also Covers Third Major Manufacturer* (Press Release, June 29, 2006), http://ag.ca.gov/newsalerts/release.php?id=1317.

[45] The most detailed description of the origin and consequences of lead in Mexican candies appears in the six-part series entitled *Toxic Treats* that ran in the *Orange County Register* in April 2004, two parts of which are cited above. *See* J.B. McKim *et al.*, Toxic Treats, *The Orange County Register* (Apr. 25-30, 2004), http://www.ocregister.com/investigations/2004/lead/part1.shtml.

[46] FDA, *Guidance for Industry, Lead in Candy Likely To Be Consumed Frequently by Small Children: Recommended Maximum Level and Enforcement Policy* (Draft Guidance) (Dec. 2005), www.cfsan.fda.gov/~dms/pbguid2.html ("*Candy Guidance*").

[47] *Candy Document* (n.39).

[48] Letter from Environmental Health Coalition to the FDA's Michael E. Kashtock (Mar. 9, 2006), http://www.fda.gov/ohrms/dockets/dockets/05d0481/05d-0481-c000007-01-vol1.pdf.

[49] FDA, *Dagoba Organic Chocolate Recalls "Eclipse 87%," "Los Rios 68%," And "Prima Matera 100%" Dark Chocolate Products Because of High Lead Levels* (Press Release, Mar. 31, 2006), http://www.fda.gov/oc/po/firmrecalls/dagoba03_06.html.

[50] *Dagoba Organic Chocolate*, http://www.dagobachocolate.com/recall/#progress.

[51] CDC, Childhood Lead Poisoning Associated with Tamarind Candy and Folk Remedies—Calif., 1999-2000, 51 *MMWR,* 684-686 (Aug. 9, 2002), Case 5.

In Vermont, gardeners should be careful where they plant their gardens. Soil may be contaminated with lead, which can be taken up into plants, especially root crops and leafy vegetables.[52] Until banned, lead arsenate was regularly used in apple orchards as a pesticide, leaving both lead and arsenic residue; lead remains in the soil for years, creating a risk of exposure in current and abandoned orchards.[53]

Another pathway for lead in food is the ingestion by chickens of lead-based paint chips and the consequent transfer of lead to their eggs. Lead contamination of egg yolks and edible chicken tissues represents a potential public health hazard, especially to children repeatedly consuming eggs from contaminated family-owned flocks.[54]

Maple sugaring equipment proved to be a lead hazard in the poisoning of a Vermont child in the mid-1990s when an evaporator with lead solder joining its interior seams was used for making homemade apple cider.[55] This incident led the Vermont Agency on Agriculture to set an action level of 250 parts per billion ("ppb") for maple syrup.[56]

The EPA has oversight over public water supplies and has set an action level for lead of 15 ppb. (See section on lead in water, below.) On the other hand, the FDA has regulatory jurisdiction over bottled water and has set a stricter standard of 5 ppb.[57] One problem is that lead may be introduced into infant formula when lead-contaminated water is used to make the formula.[58]

The FDA also has regulatory authority over food vessels,[59] some of which have been found to contain lead, including lead-soldered cans, wine-bottle foil and leaded crystal.[60] In 1995, the FDA banned leaded solder in food cans and, in 1996, lead foil on wine bottles.[61] Some foreign countries may still use lead-soldered food cans or lead in foil on wine bottles, but these imported foods are supposed to be stopped at the U.S. border.[62]

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[52] *Profile* (n.6), 295.
[53] E. Hood, *The Apple Bites Back: Claiming Old Orchards for Residential Development,* 114 Environ. Health Perspectives, A471-476 (Aug. 2006).
[54] D.W. Trampel, P.M. Imerman, T.L. Carson, J.A. Kinker and S.M. Ensley, Lead contamination of chicken eggs and tissues from a small farm flock, 15 *J. Vet. Diagn. Invest.*, 418-422 (Sept. 2003).
[55] J.K. Carney and K. M. Garbarino, Childhood Lead Poisoning from Apple Cider, 100 *Pediatrics*, 1048-1049 (Dec. 1997).
[56] Vermont Agency of Agriculture, Food & Markets, *Lead Testing Resources*, www.vermontagriculture.com/lead.htm.
[57] Kashtock (n.42).
[58] EPA, *Lead in Drinking Water*, http://www.epa.gov/OGWDW/lead/leadfacts.html.
[59] 21 U.S.C. § 321(s).
[60] Dixie Farley, *Dangers of Lead Still Linger* (FDA, 1998), http://www.cfsan.fda.gov/~dms/fdalead.html ("*Dangers of Lead*").
[61] FDA, *History of Regulatory Actions on Lead*, www.fda.gov/ohrms/dockets/dailys/03/Sept03/091503/77N-0094I-c000005-06-tab4-vol8.pdf.
[62] In the case of vintage wine, the danger may still remain. For wines bottled before 1996, the FDA recommends that all the foil be removed and that the entire neck and rim of the bottle and top of the cork be wiped with a clean wet cloth before uncorking. *Dangers of Lead* (n.60).

A product not so easily intercepted is Mexican ceramic ware. The FDA allows the use of lead glazes but with limits on leachability. Limits vary by category of ceramic ware[63]—for example, cups or mugs versus plates.[64] The key to compliance is proper firing of the piece. Most large commercial producers are able to meet these standards, but small producers in Mexico cannot be monitored in the same way, and ceramic ware may come across the border with immigrant and migrant families.[65]

> ***The Case of Lead in Ceramics***
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> Most of the current concern about lead in ceramics centers around homemade ceramics and Mexican pottery from small producers. Large commercial producers are thought to be easily able to meet lead standards, and, for the most part, they are. However, consider the case of a one-year-old child in New York City who, in July 2002, was tested with a BLL of 15 μg/dL.
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> On follow-up testing at 15 months, the child's BLL had increased to 18 μg/dL. The parents were counseled about lead hazards. An inspection of the family's home found no lead-based paint. By 18 months, the child's BLL had again increased to 23 μg/dL. A more rigorous investigation of the child's routine and environment was conducted, and commercial ceramic dinnerware manufactured in France turned out to be the culprit. The child had used the dinnerware regularly. When use was discontinued, the child's BLL decreased to 8 μg/dL by the time of a 23-month blood test.[66]

Recommendations

- Phase out the use of lead in ceramics that one can reasonably foresee will be used with food.
- Alert Vermonters to the need to flush water before use, especially when preparing infant formula. (See section on lead in water, below.)
- Collect aggregate data on Mexican farm workers in Vermont and their use of products that may contain lead. (This recommendation is also part of the Imported Cosmetics and Folk Remedies section of this report.)
- Undertake further research on the extent of exposure to lead through food and food vessels and how this exposure may contribute to overall risk, especially for children.

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[63] FDA, Office of Regulatory Affairs, Compliance Policy Guide, § 545.450, Pottery (Ceramics); Imported and Domestic—Lead Contamination, http://www.fda.gov/ora/compliance_ref/cpg/cpgfod/cpg545-450.html.
[64] Vermont Dept. of Health, *Health Regulations for Food Service Establishments*, 5-207, Item 14C, 43 (eff. Dec. 1, 2003), http://healthvermont.gov/regs/03food_estab.pdf.
[65] Kashtock (n.42).
[66] CDC, Childhood Lead Poisoning from Commercially Manufactured French Ceramic Dinnerware—New York City, 2003, 53 *MMWR*, 584-586 (July 9, 2004).

D. Other Products

Lead can still be found in a wide range of other products, from car batteries, items made of PVC plastic, and marine paint, to pool cue chalk and artist's paint—the list goes on and on. Surprisingly, lead and lead alloys continue to be actively marketed for use in manufacturing consumer products.[67]

Progress in regulating or eliminating lead in these products has occurred, but it has been patchwork in nature, responsive to the crisis of the moment. For example, when it was discovered that miniblinds made of PVC plastic presented a lead poisoning hazard to young children, the CPSC did not recall the products but asked an industry trade association to change its manufacturing process to remove lead as a stabilizer.[68] Garden hoses have been found to leach lead—in some cases, substantial concentrations of lead—posing a hazard to thirsty children on hot summer days.[69] The use of candles with metallic wicks can result in air lead concentrations many times higher than the prevailing EPA standard.[70] In August 2005, an environmental group obtained a settlement reducing the amount of lead permitted in Crest toothpaste.[71] More recently, in January 2006, NASCAR officials announced that they planned to start using unleaded fuel in 2008[72]—a welcome but long overdue measure.

This section of the report briefly discusses seven "other products"—wheel weights, ammunition and sinkers, salvaged building components, car batteries, non-residential paints and primers, hair and skin care products, and tattoos, and recommends ways of reducing lead hazards in those contexts. The Committee's choice of seven products is not intended to suggest that these items are necessarily more significant sources of exposure than other products that contain lead. However, each of these products is commonly used in Vermont; taken together, they also illustrate the need for review of other product sources of lead exposure.

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[67] Consider the website of Alchemy Castings, Inc., in Hamilton, Ontario, which sells lead-based alloys for key chains, belt buckles, flatware, novelty items, and "cost effective jewelry," http://www.alchemycastings.com/lead-products/jewelry.htm.

[68] CPSC, *CPSC Finds Lead Poisoning Hazard for Young Children in Imported Vinyl Miniblinds* (Press Release, June 25, 1996), http://www.cpsc.gov/CPSCPUB/PREREL/PRHTML96/96150.html.

[69] ConsumerReports.org, *Dare you drink from a garden hose?*, http://www.consumerreports.org/cro/health-fitness/get-the-lead-out-of-the-garden-hose-503/overview/index.htm. In 2003, Consumers Union found that first-draw samples from some commercially available hoses contained 10 to 100 times the EPA action level for lead. Many hoses are made of polyvinyl chloride, which uses lead as a stabilizer.

[70] H.L. Sobel, P. Lurie, S. M. Wolfe, Lead Exposure From Candles, 284 *JAMA*, 180 (July 12, 2000). Effective October 15, 2003, the CPSC banned metal-cored candlewicks containing more than 0.06% lead by weight in the metal. 68 Fed. Reg. 19142 (Apr. 18, 2003).

[71] The toothpaste manufacturer, Procter & Gamble, contended that any lead present in its product was naturally occurring. American Environmental Safety Institute, *Judge Enters Institute's Settlement Regarding Lead in Crest Toothpaste, Rejecting Objections of Attorney General Lockyear* (Press Release, Aug. 10. 2005), http://www.aesi.ws/Documents/crest_settlement.pdf.

[72] Associated Press, *NASCAR to Switch to Unleaded Fuel* (Jan. 20, 2006), http://img.azcentral.com/sports/speed/articles/0120nascar-ON.html.

1. Wheel weights

An estimated 70,000 tons of lead a year is used worldwide in the manufacture of wheel weights for balancing vehicle tires.[73] Lead deposition from wheel weights is a significant source of lead released into the environment; some 3.3 million pounds of these weights are deposited annually on urban streets in the U.S.[74] These releases are especially troublesome because they are not concentrated at easily identifiable point sources but are randomly scattered across roadways.

An average vehicle contains ten wheel weights (two on each of the four wheels and two more on the spare), the majority of which are clip-on types that can detach from the wheel's rim. One study has found that on average, 3% of these wheel weights fall off onto roadways, where they are pulverized by traffic and carried into waterways by rainwater.[75] Busy streets and parking lots are the primary sources of lead in urban runoff and can contaminate the water supply and harm aquatic life.[76]

Lead-free alternatives are available. Effective July 2005, the European Union banned the use of lead wheel weights. Alternatives made of tin, zinc, steel and other materials have rapidly become standard in Europe.[77] The availability of these alternative products remains limited in the U.S. because they have not yet reached regular distribution channels, though there are major manufacturers in North America.[78] The cost of alternatives made of tin is currently about 32 cents per wheel higher than lead.[79]

While the EPA has denied a petition for rulemaking to prohibit the production and use of lead-containing wheel weights,[80] lead reduction efforts have already been undertaken on the state and local level, and by manufacturers. For example, the States of Minnesota and Maine have announced programs to phase out lead wheel weights on state vehicles;[81] the City of Ann Arbor, Michigan, has announced a phase-out of lead wheel weights on city vehicles;[82] and the King County (Washington) Department of Transportation is conducting a fleet trial by testing

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[73] The Ecology Center, *Lead-Free Wheels, What Is the Problem With Lead Wheel Balancing?*, http://www.leadfreewheels.org/problem.shtml.

[74] R.A. Root, Lead Loading of Urban Streets by Motor Vehicle Wheel Weights, 108 *Environ. Health Perspectives*, 937-940 (Oct. 2000). A more recent study by the U.S. Geological Survey estimates that in 2003, 4 million pounds (2,000 tons) of lead may have been dispersed into the environment by wheel weights. K. Christen, Tires and lead: A weighty issue, *Science News* (Aug. 2, 2006), http://pubs.acs.org/subscribe/journals/esthag-w/2006/aug/science/kc_tires.html.

[75] K. Christen, Tires and lead: A weighty issue.

[76] *Ibid.*

[77] The Ecology Center, *Lead-Free Wheels, Alternatives*, http://www.leadfreewheels.org/alts.shtml.

[78] The Ecology Center, *Wheel Weight Survey*, http://www.leadfreewheels.org/models.shtml.

[79] The Ecology Center, *Lead-Free Wheels, Project Partners*, http://www.ecocenter.org/200310/leadfreewheels200310.shtml.

[80] Letter from Susan Hazen, Principal Deputy Assistant Director, EPA, to Jeff Gearhart (Aug. 8, 2005), http://www.leadfreewheels.org/TSCA_LeadWW_Response.pdf.

[81] The Ecology Center, *Lead-Free Wheels, State announces program to phase-out lead wheel weights on state vehicles*, http://www.leadfreewheels.org/release20040315minnesota.shtml; State of Maine, Executive Order 12 FY 06/07, *An Order Promoting Safer Chemicals in Consumer Products and Services* (Feb. 22, 2006), http://www.chemicalspolicy.org/downloads/MaineExecOrder2006.pdf.

[82] The Ecology Center, *Lead-Free Wheels, Ann Arbor announces program to phase-out lead wheel weights on city vehicles*, http://www.leadfreewheels.org/release20040315annarbor.shtml.

a new wheel weight product comprised of hollow plastic tubes filled with polymer powder and capped, called XactBalance.[83] In addition, some new vehicle models from Toyota, Subaru and Honda have lead-free weights put on in the factory.[84] It is important to note that even though these vehicles are sold with lead-free weights, they may be replaced with lead-containing weights at the next tire re-balancing done at a local garage. Dealer garages tend to offer the same lead-free alternatives but have indicated that depending on the size of the weight needed, or if there are alloy wheels,[85] they may still use lead-containing weights.[86]

Recommendations

- Consider a phase-out of lead wheel weights in Vermont.
- Convert state fleet vehicles from lead to less toxic wheel weight materials.

2. Ammunition and sinkers

Since the invention of gunpowder and firearms, lead has been widely used as the primary component of ammunition. Current uses of lead in ammunition are in slugs, bullets and shot. Primer caps and fuses may also contain lead compounds.[87] Contamination of the environment can be particularly concentrated in areas of repeated firing of weapons.[88] Environmental contamination by lead shot has been shown to be a significant source of lead poisoning and death in waterfowl, migratory birds and other animals. A federal ban on the use of lead shot for waterfowl hunting has led to significantly reduced poisoning and death by ingestion of lead shot in waterfowl.[89]

Lead can be absorbed from ammunition in several ways. It can be absorbed through the skin[90] by normal handling of ammunition in loading a weapon, home reloading shells or casting lead slugs or balls. Lead fumes are emitted when a rifle or handgun fires ammunition that does not have a full metal jacket;[91] lead primers used in ammunition will emit lead fumes.[92] Indoor firing ranges in particular can concentrate exposure to lead fumes from firing

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[83] King County Environmental Purchasing Program, Environmental Purchasing Bulletin #92, *Lead-Free Wheel Weights*, http://www.metrokc.gov/procure/green/bul92.htm.
[84] The Ecology Center, *Wheel Weight Survey*, http://www.leadfreewheels.org/models.shtml.
[85] Some alternative metals such as zinc and tin may cause corrosion on alloy wheel rims.
[86] Telephone calls from Robert Zatzke to Bob Meservey, Service Manager at Town & Country Honda, Berlin, Vermont, and Robert Metivier, owner of Premier Tire and Automotive, Milton, Vermont (Apr. 12, 2006).
[87] Wikipedia, *Percussion cap,* http://en.wikipedia.org/wiki/Percussion_cap.
[88] C. Rooney, *Contamination at Shooting Ranges* (Soil, Plant and Ecological Sciences Division, Lincoln University, Canterbury, New Zealand), http://www.lead.org.au/fs/shootingranges.pdf.
[89] U.S. Fish & Wildlife Service, Southeast Region, *Service Continues to Expand Non-Toxic Shot Options—Study Shows Ban on Lead Shot Saves Millions of Waterfowl* (Oct. 25, 2000), http://www.fws.gov/southeast/news/2000/r00-045.html ("*Ban on Lead Shot Saves Millions of Waterfowl*").
[90] J.L. Stauber, T.M. Florence, B.L. Gulson and L.S. Dale, Percutaneous absorption of inorganic lead compounds, 145 *Sci. Total Environ.*, 55-70 (1994).
[91] T.L. Jones, Frangible and Nontoxic Ammunition, *Police and Security News*, http://www.policeandsecuritynews.com/janfeb01/frangibleammunition.htm.
[92] CDC, Reducing Exposures to Airborne Lead in Indoor Firing Ranges—United States, 32 *MMWR*, 483-484, 489 (Sept. 23, 1983).

lead ammunition unless proper ventilation is used,[93] and lead contamination in such ranges can be tracked home on clothing and present a source of exposure to other family members.[94] Lead slugs and bullets have also been shown to produce hundreds of small fragments in animals killed by hunters,[95] which raises the likelihood of humans ingesting lead particles by consuming meat from the animal; ingestion of as little as one lead shot pellet has been shown to cause seriously elevated BLLs in humans.[96]

Lead can also cause environmental contamination. For example, fragmentation of lead slugs in killed game has been shown to be a source of lead exposure in animals that feed on organs that are field dressed or removed from killed game animals in the field.[97] Areas of concentrated firing of guns such as at trap and skeet gun clubs can cause significant environmental contamination.[98] This may be particularly true where lead shot is used at a fixed firing stand for skeet (clay pigeon) target shooting. Moreover, prohibiting lead shot for waterfowl hunting[99] has been shown to be highly successful in preventing wildlife exposure to lead and has reduced death associated by lead poisoning in endangered or threatened species.[100]

Ammunition made from other metals or combinations of metals has been shown to have minimal to no toxicity to wildlife.[101] Several non-toxic alternatives have been developed and approved for use, containing copper, bismuth, tungsten, steel, tin and alloys of these metals. High performance all-copper bullets are now available in most rifle calibers. In comparison to lead and copper-jacketed bullets, all-copper and TTB (tin-bismuth alloy) bullets do not fragment and are far less toxic.[102]

Several types of alternative alloy shot have been approved for waterfowl hunting; use of these alloys has been highly successful in reducing lead poisoning in waterfowl, and hunters are already required to use alternative alloy shot for waterfowl.[103] The existing restrictions could be expanded to include the use of alternatives for other game species, similar to efforts being

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[93] National Institute for Occupational Safety and Health, *Lead Exposure and Design Considerations for Indoor Firing Ranges* (DHEW publication no. 76-130, Dec. 1975), http://www.cdc.gov/niosh/topics/ranges/pdfs/76-130.pdf.

[94] *Ibid.*

[95] W.G. Hunt, W. Burnham, C.N. Parish, K. Burnham, B. Mutch and J.L. Oaks, Bullet Fragments in Deer Remains: Implications for Lead Exposure in Avian Scavengers, 34 *Wildlife Soc. Bull.*, 167-170 (2005).

[96] P. Gustavsson and L. Gerhardsson, Intoxication from an accidentally ingested lead shot retained in the gastrointestinal tract, 113 *Environ. Health Perspectives*, 491-493 (Apr. 2005).

[97] D. M. Fry, *Assessment of Lead Contamination Sources Affecting California Condors—Final Report*, Univ. of Calif. Davis (Apr. 7, 2003).

[98] Violence Policy Center in collaboration with The Environmental Working Group, *Poisonous Pastime—The Health Risks of Shooting Ranges and Lead to Children, Families, and the Environment*, 9 (May 2001), http://www.ewg.org/reports_content/poisonouspastime/poison.pdf.

[99] This prohibition can be found at 50 C.F.R. § 20.21(j).

[100] *Ban on Lead Shot Saves Millions of Waterfowl* (n.89).

[101] Project Gutpile, *The Unleaded hunter*, http://www.projectgutpile.org/hunting.html.

[102] *Ibid.*

[103] U.S. Fish & Wildlife Service, *U.S. Fish & Wildlife Service Approves an Additional Nontoxic Shot Type; Considers Four Others* (News Release, Aug. 23, 2005), http://www.fws.gov/news/newsreleases/showNews.cfm?newsId=E3C6B8D8-65BF-03E7-2F823FD07A1EA592.

undertaken in Washington State and California.[104] In addition, Canada has banned lead shot for hunting migratory game birds, and several European countries have implemented bans.[105]

As of January 1, 2006, it was unlawful to sell or offer for sale lead sinkers in Vermont weighing one-half ounce or less; one year later, a ban on using such sinkers for fishing went into effect.[105a] With a $25,000 appropriation, DFW has undertaken a program to educate the public about the threat that lead fishing tackle can pose to wildlife, including posters, license holders, mailings, inserts in newsletters and calendars, free sample non-lead sinkers, bookmarks, paid ads, website postings, and programs to dispose of lead sinkers.[105b]

Because of lead's recognized toxicity to humans and wildlife and its longevity in the environment, efforts should be undertaken to reduce its use and educate users about risks. While elimination of lead in ammunition would best protect users and the environment, there is likely little public support for such an approach. Proactive education and outreach by stakeholders can significantly diminish lead use, reducing the need for regulatory restrictions.

Recommendations

- Incorporate lead awareness information into existing hunter safety courses and hunter license renewal materials, and ensure the posting and distribution of similar information at shooting ranges and clubs and in gun shops.[105c]
- Encourage both the adoption of EPA's best management practices for outdoor firing ranges[106] and the enforcement of OSHA's air quality standards for indoor ranges.[107]
- Adopt policies to minimize the exposure of children to leaded ammunition.
- Work toward the expansion of the ban on lead sinkers.
- Encourage the use of non-toxic shot for skeet and clay shooting.

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[104] The legislatures of Washington State and California have introduced bills to ban lead shot: HB 1822—2005-06 (Washington bill to phase out use of "toxic shot"), http://www.leg.wa.gov/pub/billinfo/2005-06/Pdf/Bills/House%20Bills/1822.pdf; Assembly Bill No. 1002 (Feb. 22, 2005) (California bill to ban or phase out leaded ammunition for hunting), http://info.sen.ca.gov/pub/bill/asm/ab_1001-1050/ab_1002_bill_20050407_amended_asm.pdf.

[105] *Environment Canada, A review of the environmental impacts of lead shotshell ammunition and lead fishing weights in Canada*, http://www.cws-scf.ec.gc.ca/ publications/papers /88/ tabl8_e.cfm.

[105a] 10 V.S.A. § 4614 and 4606(g), respectively.

[105b] Meeting with Thomas Decker , Director, DFW (Jan. 17, 2007).

[105c] DFW has a number of initiatives on lead in ammunition, including the use of steel shot for educational programs on shooting (e.g., at conservation camps); hand-washing protocols for shooters in such camps and in hunter education programs; development of range management plans; and standards for the 4-H Shooting Sports Program. Email from Thomas Decker, Director of Operations, DFW, to Elliot Burg (Jan. 18, 2007).

[106] EPA, *Best Management Practices for Lead at Outdoor Shooting Ranges*, http://www.epa.gov/region2/waste/leadshot/.

[107] OSHA's Lead in Industry Standard requires that no employee of a fixed facility be occupationally exposed to lead as measured by air sampling to a level higher than 50 $\mu g/m^3$ of air at a time-weighted average per 8-hour workday. 29 C.F.R. § 1910.1025(c). The "action level" triggering certain obligations—for example, medical surveillance, 29 C.F.R. § 1910.1025(j)—is 30 $\mu g/m^3$. 29 C.F.R. § 1910.1025(b).

3. Salvaged building components

Because of its widely recognized toxicity, lead paint was banned from use in residences in 1978. However, one loophole in the system of regulation of lead paint in housing is the law's failure to cover the sale and re-use of salvaged building components that may contain lead. The fact is that older building components and furniture older than the 1978 ban on lead paint may contain lead. For example, approximately 75% of the bathtubs in pre-1978 Vermont housing have been found to contain lead in the porcelain glaze.[108] (Older claw-foot bathtubs have become a popular retro-look item and can be found for sale in many salvage yards.) Of the bathtubs that contain lead, 40% have been found to have elevated levels of lead dust when wipe-sampled. Testing has also indicated that lead may leach into the water when lead dust is found on a tub surface.[109]

Significantly, salvage yards, antique stores and furniture refinishers are not required to disclose information regarding potential lead hazards, although some do voluntarily offer lead information.[110] Several cases of lead poisoning have occurred in Vermont from reworking lead-painted building components; in most cases, the persons affected were unaware of the danger of lead. Specifically:

- In 1997, an abatement worker was poisoned by hand sanding chemically stripped window sashes. The worker had a BLL of 40μg/dL after two days of hand sanding and prepping 20 window sashes.
- In February 2006, a couple in Montgomery, Vermont, purchased a door from a salvage yard and had it chemically stripped to remove paint. Sanding the door in the house resulted in the entire upstairs of the home being contaminated with dangerous levels of lead dust. In addition, the couple's 15-month-old daughter had a BLL of 13μg/dL, and one of the adults had a BLL of 13μg/dL. When the couple described their story to the salvage yard where the door was purchased, employees said they were surprised that lead would be a problem after stripping.
- In March 2006, as a result of limited outreach efforts, some salvage yards posted information on lead hazards in salvaged components. Posted information in a Brattleboro salvage yard resulted in one family's having their child tested after the purchase of several old window sashes for reuse in a post and beam home they were constructing. Follow-up testing found that the child had a BLL of 17 μg/dL, and hazardous levels of lead dust were found in several spots in the home. A dust wipe sample found 1300 μg of lead on one of the sash rails.[111]

Even if there is an awareness of lead hazards, a common misconception regarding salvaged components is that if the paint is removed by chemical stripping, it is lead-free. Experience has shown that stripped components with no visible paint still contain significant amounts of

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[108] R. Zatzke, *Mobility of Lead in Porcelain Glazed Bathtubs*, Vermont Housing & Conservation Board Lead-Based Paint Hazard Reduction Program (Dec. 4, 2003).
[109] Research conducted by Robert Zatzke, Vermont Housing & Conservation Board.
[110] Telephone conversation between Robert Zatzke and Tom Longstreth, Executive Director, Recycle North, Burlington, Vermont (Feb. 27, 2006).
[111] The case of the Montgomery family is reported in R. Zatzke, *Children at Risk From Salvaged Components* (Vermont Housing & Conservation Board Lead-Based Paint Hazard Reduction Program, Feb. 10, 2006); the other two studies are based on Mr. Zatzke's personal experience.

lead in the substrate. Cases of poisoning can be prevented with better dissemination of information.

Recommendations

- Provide information to consumers on lead in salvaged components at salvage yards, antique outlets and furniture stripping/refinishing facilities in Vermont, as well as on pertinent websites.[112]
- Require information on lead paint hazards on pre-1978 components as part of sales transactions.

4. Car batteries

The use of lead in car batteries is currently the leading source of lead in consumer products. According to the U.S. Geological Survey's 2006 Mineral Commodity Summary, in 2005 the lead-acid battery industry continued to be the principle user of lead;[113] it accounted for no less than 85% of the total U.S. lead consumption.[114] The average lead-acid battery in an automobile has been found to weigh about 15 kg, with lead and lead compounds making up about 75% of the battery's mass.[115]

The fundamental difficulty with regulating lead-acid batteries is the current lack of a feasible alternative. Typically, alternative substances have been found to be less efficient and considerably more expensive.[116] However, alternatives have been identified and are the subject of research, including lithium-ion and nickel-metal hydride batteries.[117]

In Vermont, the *disposal* of lead-acid batteries is regulated. No person may knowingly dispose of such batteries in a landfill in the state; manufacturers must ensure that there is a system for collecting, transporting and processing waste batteries and inform purchasers of that system; rechargeable consumer products with such batteries must be designed so that the batteries can easily be removed and labeled as to proper disposal; and retailers and wholesalers are obligated to accept used lead-acid batteries from customers at the point of transfer, subject to certain quantitative limits.[118]

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[112] For example, Vermont Department of Environmental Conservation (DEC), Waste Management Division, *Managing Lead-Containing Paint Waste*, http://www.anr.state.vt.us/dec/ead/sbcap/pdf/fs_LCP_wm.pdf.
[113] P. Gabby, *Mineral Commodity Summaries 2006: Lead*, U.S. Dept. of Interior, U.S. Geological Survey (2006), 96-97, http://minerals.usgs.gov/minerals/pubs/mcs/2006/mcs2006.pdf.
[114] *Ibid.*, 96. About 10% of lead was used in ammunition; casting material; sheets (including radiation shielding), pipes, traps and extruded products; cable covering, calking lead, and building construction; solder; and oxides for glass, ceramics, pigments and chemicals. The balance was used in ballast and counter weights, brass and bronze, foil, terne metal, type metal, wire and other products.
[115] J. Gearhart *et al.*, *Getting the Lead Out: Impacts of and Alternatives for Automotive Lead Uses*, Environmental Defense *et al.* (2003), http://www.cleancarcampaign.org/GettingLeadOut.pdf ("*Getting the Lead Out*"), 4.
[116] A. Trafton, *MIT powers up new battery for hybrid cars*, Mass. Institute of Technology News Office (Feb. 16, 2006), http://web.mit.edu/newsoffice/2006/battery-hybrid.html.
[117] *Ibid.* and *Getting the Lead Out* (n.116).
[118] 10 V.S.A. §§ 6621a *et seq.*

Recommendations

- Consider requiring manufacturers to notify consumers of the lead content in their batteries and the risks lead poses.
- When there are feasible alternatives to lead-acid batteries, consider a phase-out approach of appropriate duration.

5. Non-residential paints and primers

Although lead compounds have been prohibited for use in residential paint since 1978, commercial and non-residential use of lead compounds in paints and primers is still allowed.[119] For example, lead tetraoxide (red lead) is used as a rust inhibitor in paints and primers on structural steel and ironwork[120] and for marine anti-fouling applications.[121] Paints and primers formulated for bridges and boats may contain up to 95% lead by weight.[122] However, because non-lead alternative rust inhibitors and pigments are widely available for use in paints and primers,[123] lead is not an essential component of paint.

In general, there are two forms of exposure to be concerned about with the use of lead-based paints and primers: exposure of workers (bridge, automotive and marine workers) who use these paints and primers, and their families, as described in the section on Occupational/Take-Home Lead, below;[124] and environmental contamination resulting from the removal of lead-based paint without proper precautions to contain the waste.

Such exposure can occur from at least three sources. One is structural steel that is covered with lead paint or primer. This does not present much risk of exposure unless the steel is exposed, is accessible by children or is disturbed by construction or renovation. However, removal of paint from bridges has been shown to contaminate soil; in the past, it was common to sand blast paint from bridges without containing the waste.[125] Another example of significant exposure was found to be the lead primer used on steel girders as rescue workers

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[119] 16 C.F.R. § 1303.

[120] National Paints, *Technical Specifications, National Red Lead Primer*, http://www.national-paints.com/pdf/Protective/Data/pro2-3.pdf.

[121] Sanpaco Marine Products (description of red lead primer), http://www.sanpaco.com/search.asp?query=6632. Biofouling is the accumulation of microorganisms, plants, algae and animals on submerged structures, especially ships' hulls. Anti-fouling coatings are toxic to these organisms.

[122] Hybrivet Systems, *Testing Red Lead*, http://www.leadcheck.com/PB-07.html.

[123] *Getting the Lead Out* (n.116), 27; J. Bailey, Editor, Mercedes Explores New Territory, Lead-free E-coat and a pendulum conveyor are just two of the "firsts" at the automaker's new U.S. plant, *Industrial Paint & Powder Magazine*, http://www.ppg.com/car_indcoat/ts_mercedes.htm.

[124] *See also* J. Wells, Lead Poisoning Found in Nine Bridge Workers, State officials alarmed by extent of exposure, *San Francisco Chronicle* (Oct. 10, 2000), http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2000/10/10/MN102479.DTL&hw=bridge+workers&sn=002&sc=694.

[125] Examples of this contamination are described in B. Prenney, Community lead exposure, *Am. J. Indus. Med.*, 191-195 (Jan. 1993); M. Dias, Lead-tainted soil to be cleaned up, *The Kentucky Post* (Sept. 21, 2000), http://www.kypost.com/news/2000/lead092100.html; and Ramapo College of New Jersey, *Ramford County Bridge and Other Steel Structures That Have Deteriorating Lead Paint* (2000), http://www.rst2.edu/ties/LEAD/incident/puppy/br_pup1.htm.

participated in the cleanup of the smoldering debris of the World Trade Center site after September 11, 2001.[126]

A second source is the use of lead in automotive and machinery paints to inhibit rust and as a pigmenting agent, although generally in much smaller quantities than in steel and marine paints. In 2000, the State of Minnesota was set to implement a ban on several types of automotive paint that were found to contain lead, but the affected manufacturers agreed voluntarily to remove lead from their products.[127] Currently, there is no comprehensive list of automotive paints and their lead content, so it is uncertain how widespread the use of lead in automotive paints still is.

A third source is the use of lead in anti-fouling paints for ships and boats, available for both commercial and private use. There are several sellers of such paint on the Internet, but it is unclear how widespread their use is in Vermont.

Recommendations

- Phase out lead in paints and primers for automotive, structural and marine uses.
- Require education on the risk of lead in non-residential paints as a condition of registering motor vehicles, and as a part of the boating safety education required by 23 V.S.A. § 3305b.

6. Hair and skin care products

There are a number of hair and skin care products on the market that contain lead acetate, a lead compound. *Skin Deep: A Safety Assessment of Ingredients in Personal Care Products*, published by The Environmental Working Group (EWG) and the Campaign for Safe Cosmetics, lists 24 such products, including 12 L'Oréal brand shampoos and shampoo-conditioners, 2 Kerastase shampoos, 2 Phyto shampoos and a conditioner, Bodycoffee moisturizer, Grecian Formula hair color and bleaching, EBL hair color and bleaching, Imam facial cleanser, Africa's Best relaxer, and 2 Phisoderm products (baby soap and facial cleanser/acne treatment).[128] Some of these products are targeted at children, such as the L'Oreal Kids line, the Africa's Best Kids Organics relaxer, and the Phisoderm baby soap. Making identification more difficult, lead acetate is often listed as an ingredient under a synonym not readily recognized by the average consumer.[129]

Federal law prohibits the marketing of cosmetics in interstate commerce that contain any "poisonous or deleterious substance which may render it injurious to users" under labeled or

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[126] A. S. Geyh, Johns Hopkins School of Public Health, *Exposure and Health of Workers Involved in the World Trade Center Clean Up Effort* (slides, undated), http://www.med.nyu.edu/environmental/assets/geyh.pdf.
[127] Minnesota Pollution Control Agency, Listed Metals Advisory Council, *Findings of Fact and Conclusions, 4/20/2000* (available from the Agency).
[128] Environmental Working Group (EWG), *Skin Deep, Product[s] That Contain: Lead Acetate*, http:www.ewg.org/reports/skingdeep2/search.php?productscontain=2741.
[129] EWG, *Skin Deep, Ingredient Report: Lead Acetate* (noting that lead acetate may also be listed on product labels as Gilead balm, balm of Gilead extract and disodium ricinoleadmido mea-sulfosuccinate), http://www.ewg.org/reports/skindeep2/report.php?type=INGREDIENT&id=2741.

usual conditions of use.[130] However, cosmetics are not subject to FDA premarket approval, and cosmetic firms are responsible for substantiating the safety of their products.[131] While some ingredients are specifically prohibited or restricted, lead compounds are not among them.[132] In addition, if the safety of a cosmetic product is brought into question, the FDA is not authorized to recall that item.[133]

Color additives in hair dyes do require FDA approval prior to sale,[134] and the agency has approved the use of lead acetate for that purpose in such products, having made a determination that it does not cause a significant increase in BLLs.[135] However, by regulation, the labels on these products must contain a warning that lead acetate is an ingredient, that the product should be kept out of children's reach, and related instructions.[136]

Canada has banned the use of lead acetate in all cosmetic products,[137] including in progressive hair dyes.[138] The European Union has a similar ban but excepts the use of lead acetate in hair treatment products.[139]

Recommendation

- Ban the use of lead compounds in hair and skin care products that one can reasonably foresee will be used by or on children.

7. Tattoos

A tattoo is a series of puncture wounds made with a needle that carries dye or ink into different levels of the skin. In recent years tattoos have become increasingly popular; in the United States, an estimated 13% of all persons 18 to 24, and 16% of all adults, have at least one tattoo.[140] The FDA does not regulate tattoos, leaving the responsibility for tattoo safety up to the states. The State of Vermont does regulate tattooists[141] but not the ingredients used in tattoo inks and dyes. However, an analysis by the American Environmental Safety Institute

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[130] 21 U.S.C. § 361.
[131] FDA, *FDA Authority over Cosmetics, What does the law say about cosmetic safety and labeling?* (Mar. 3, 2005), http://www.cfsan.fda.gov/~dms/cos-206.html ("*FDA Authority over Cosmetics*").
[132] *Ibid.*; 21 C.F.R. part 700.
[133] *FDA Authority over Cosmetics* (n.132).
[134] 21 U.S.C. § 379e(a).
[135] FDA, *Lead Acetate in Hair Dye Products* (Jan. 9, 2002), http://vm.cfsan.fda.gov/~dms/cos-lead.html.
[136] *Ibid.*; 21 C.F.R. § 73.2396.
[137] Health Canada, *Consumer Product Safety, List of Prohibited and Restricted Cosmetic Ingredients* (the Cosmetic Ingredient "Hotlist") (May 2005), http://www.hc-sc.gc.ca/cps-spc/person/cosmet/hotlist-change-liste_e.html.
[138] S. Page and S. Allan, Grecian Formula in a grey zone after ban, *The Gazette* (Montreal) (Nov. 8, 2005), http://www.canada.com/montreal/montrealgazette/news/story.html?id=6caa01c2-3fb0-4431-a559-43aeece93860&rfp=dta.
[139] Eur-Lex, European Union, Council Directive of 27 July 1976 (76/768/EEC), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31976L0768:EN:HTML. Lead and lead compounds are no. 289 on the list of prohibited substances in Appendix II; the exception is set out in Appendix V.
[140] J.M. Sever, A Third of Americans with Tattoos Say They Make Them Feel More Sexy, *The Harris Poll* #58 (Oct. 8, 2003), http://www.harrisinteractive.com/harris_poll/index.asp?PID=407.
[141] 26 V.S.A. ch. 79 (Tattooists and Body Piercers).

found that tattoo ink may contain lead, antimony, arsenic, beryllium, chromium, cobalt, nickel and/or selenium,[142] all of which are toxic or carcinogenic to the human body.[143] Tattoo ink manufacturers have typically been under no obligation to label the ingredients used. However, in September of 2005, a California court ordered two major manufacturers of tattoo ink to add warning labels to their products, informing consumers that the inks and pigments contain heavy metals, including lead and arsenic, and advising pregnant women and those of childbearing age to consult their doctors before getting a tattoo.[144]

Recommendations

- Phase out or ban the use of tattoo inks and dyes containing lead.
- Pending phase-out, (a) require the education of tattooists regarding hazardous components in tattoo inks and dyes, as a requirement of registering with the State, (b) require point-of-sale education to consumers by tattooists regarding such hazardous components, and (c) require health warning labels on tattoo inks and dyes.

E. The Problem of Exported "e-Waste"

One of the indirect but significant impacts of the sale in Vermont of products with lead in them is that those products must be disposed of somehow; and one major source of disposed-of lead is electronic waste. Lead is widely used in electronic products. Its highest concentrations are found in computer monitors—3 to 8 pounds per monitor. High levels of lead are also found in television screens and in the solder used in circuit boards and other components.[145]

According to the United Nations Environment Programme:

> The production of electrical and electronic devices is the fastest-growing sector of the manufacturing industry in industrialised countries. At the same time, technological innovation and intense marketing engender a rapid

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[142] American Environmental Safety Institute, *American Environmental Safety Institute Files Public Health Lawsuit Against Tattoo Ink and Pigment Manufacturers* (Press Release, Aug. 2, 2004), http://www.aesi.ws/Documents/Tattoo%20Complaint%20Press%20Release.pdf; *see also American Environmental Safety Institute v. Huck Spaulding Enterprises, Inc.*, No. BC319440 (Los Angeles Cty. Super. Ct.), Declaration of D. J. Northington, Ph.D., in Support of Plaintiff American Environmental Safety Institute's Motion for Preliminary Injunctive Relief (lead detected in all 22 tattoo ink samples tested by California laboratory, in most cases above the Proposition 65 trigger of 0.5 µg per day of exposure).

[143] Other investigations have found high levels of copper, cadmium, and iron compounds in tattoo ink. *See* W. A. Wagle and M. Smith, Tattoo-Induced Skin Burn During MR Imaging, 174 *Am. J. of Roentgenology*, 1795 (2000).

[144] M. Smith, California Judge Rules Tattoo Inks Must Carry Health Warnings, *MedPage Today* (Sept. 22, 2005) (reporting on the *Huck Spaulding* litigation), http://www.medpagetoday.com/Dermatology/GeneralDermatology/tb/1785.

[145] Basel Action Network *et al.*, *Exporting Harm, The High-Tech Trashing of Asia* (Feb. 25, 2002) ("*Exporting Harm*"), 9, http://www.ban.org/E-waste/technotrashfinalcomp.pdf. Televisions present the same issue of lead disposal as computer screens. Telephone conversation between Michael Powers, Investigator, Vermont Attorney General's Office, and Robin Ingenthron, President of American Retroworks, Inc., in Middlebury, Vermont (July 13, 2006). Ingenthron is also President of the World Reuse, Repair and Recycling Association ("WR3A"), a non-profit trade association that has set standards for exporting e-waste. http://www.retroworks.com/WR3A_Folder/standards2004.htm.

> replacement process. Every year, 20 to 50 million tonnes of electrical and electronic equipment waste ("e-waste") are generated world-wide, which could bring serious risks to human health and the environment.[146]

The quantities of material involved are vast. It is estimated that more than 500 million computers will become obsolete in the United States between 1997 and 2007.[147]

To the extent that computers and other electronics containing lead are responsibly recycled, the immediate risk of toxic exposure is low.[148] However, many of these items—including, by one estimate, 50% to 80% of computers and televisions "recycled" in the U.S.[149]—are exported to Third World countries, including China, India and Pakistan. There they are taken apart and valuable components separated out for resale. Recent reports have documented grievous environmental degradation in communities where e-waste is handled in this manner, including toxic fumes from de-soldering circuit boards, bathing the boards in acids and burning waste, and polluted soil and water from dumping toxic materials.[150] Cheap labor, lack of environmental standards and the legality of e-waste export from this country all contribute to this phenomenon.[151]

Although there are many toxins that result from this process—including cadmium, mercury, multiple forms of chromium, and plastics that produce dioxin when burned[152]—lead is among them. Exposure to lead can result from breaking open cathode ray tubes (computer monitors and televisions), de-soldering circuit boards and burning waste boards.[153]

The victims of e-waste exporting are not Vermont residents, but rather citizens of other countries. Nonetheless, arguably Vermont has a responsibility not to increase human exposure to lead and other toxins, regardless of where that exposure occurs.

Some computer companies have undertaken programs to collect and recycle old computers and printers or offered rebates to consumers who trade in old PCs for new ones. More recently, Apple offered free recycling of old computers to consumers who buy new ones from Apple, and Dell will now recycle its machines for free regardless of whether the owners are buying replacement systems from Dell.[154] Gateway, Canon and Epson collect used computer

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[146] UNEP, *E-waste, the hidden side of IT equipment's manufacturing and use* (Jan. 2005), http://www.grid.unep.ch/product/publication/download/ew_ewaste.en.pdf, 1.
[147] *Ibid.*, 2.
[148] *Profile* (n.6), 294.
[149] *Exporting Harm* (n.146), 4.
[150] *Ibid.*; Greenpeace International, *Recycling of Electronic Wastes in China & India: Workplace & Environmental Contamination* (Aug. 2005), http://www.greenpeace.org/raw/content/international/press/reports/recycling-of-electronic-waste.pdf.
[151] The United States has not signed the international agreement that regulates the export of e-waste, the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal. In addition, the Resource Conservation and Recovery Act (RCRA) exempts the export of e-waste from federal regulation because it is considered "recycled." 42 U.S.C. § 6901.
[152] *Exporting Harm* (n.146), 9.
[153] *Ibid.*, 26.
[154] *Apple and the Environment*, http://www.apple.com/environment/recycling/nationalservices/us.html; L.J. Flynn, Dell Expands Its Computer Recycling Program, *The New York Times* (June 29, 2006).

and printer parts for recycling; Best Buy has a computer recycling program.[155] However, it is unclear whether such rebates or other recycling programs ultimately involve exporting e-waste to Asia. Moreover, no two companies have the same programs, and none is capable of accepting all the e-waste generated by consumers and small businesses.[156a]

A number of states have enacted laws or regulations addressing the disposal of e-waste, including some that address procurement practices, ban landfill disposal or create recycling funds or other programs. For example, California imposes an "advance recovery fee" of $6 to $10 on the sale of electronic products; and Maine requires municipalities to ensure that computer monitors and televisions generated as household waste are delivered to a consolidation facility, and manufacturers to take responsibility for the handling of computer monitors (and, beginning in 2012, for televisions).[156]

Most of Vermont's solid waste districts, as well as other public entities and private companies, have recycling programs that involve e-waste.[157] Computer waste is handled in two categories: (1) color CRTs (monitors), which cannot be disposed of in landfills but must be recycled and may be taken to drop-off points designated by the waste districts or other entities and recycled for a fee; and (2) all other parts of computers, which may be taken to recycling, to scrap metal or to landfills. Chittenden Solid Waste District (CSWD), for example, has six drop-off points to which computer monitors can be taken for $3.00 each and televisions for between $3.00 and $9.00, depending on screen size.[158]

Among the issues for recycling e-waste are apportioning responsibility and cost, and assuring that recycling is conducted within the state or the U.S. and not exported to Asia. In the absence of federal regulation governing the transport of e-waste, the latter issue is likely to be the most difficult to address.

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[155] These programs are described on the respective companies' websites, http://www.gateway.com/about/corp_responsibility/environment.shtml, http://www.usa.canon.com/templatedata/AboutCanon/ciwencrpr.html, http://epson.com/cgi-bin/Store/Recycle/RecycleProgram.jsp, http://communications.bestbuy.com/communityrelations/recycling.asp.

[155a] E. Grossman, *High Tech Trash; Digital Devices, Hidden Toxics, and Human Health* (2006), 151.

[156] *See* D. Griffin, *Environment, Energy and Transportation Program, Electronic Waste,* National Conference of State Legislatures (July 2005), http://www.ncsl.org/programs/environ/cleanup/Elecwaste.htm. Other sources of information on e-waste measures include the EPA, http://www.epa.gov/epr/products/electronics.htm, and the Northeast Recycling Council (NERC), http://www.nerc.org/.

[157] DEC, *Where to Reuse and Recycle your Computers and Televisions* (Feb. 2006), http://www.anr.state.vt.us/dec/wastediv/R3/computers.htm.

[158] Telephone interview between Michael Powers, Investigator, Vermont Attorney General's Office, and Nancy Plunkett, Chittenden Solid Waste District (CSWD) (Feb. 28, 2006). According to Ms. Plunkett, CSWD has a recycling contract with American Retroworks, d/b/a Good Point Recycling, in Middlebury, Vermont. Good Point attempts to resell as many computer parts as possible. Some parts are sent to Electronicycle in Massachusetts; others are disassembled and sent to other companies. At least some computer parts not recycled are sent to the landfill in Coventry, Vermont. CSWD relies on Good Point to be responsible in its recycling methods and in selecting recipients of computers and parts. As for Vermont state procurement, that ties into the same system: all electronic waste, including CRTs (from both computers and televisions), is sent to surplus properties, whether it is to be reused or scrapped; if scrapped, it is sent to Good Point Recycling and from there to Electronicycle. All other components can be sent to any metal recycler, and the current contract-holder is All Metals Recycling in Hardwick, Vermont. Telephone interview between Michael Powers and Richard Lee, Vermont Surplus Properties Programs Assistant (Apr. 26, 2006).

Recommendations

- Work with other states to enact laws banning the export of e-waste and requiring manufacturers of specified electronics to take the products back and recycle or reuse the components.
- Encourage Vermont's Congressional delegates to support the Basel Convention.
- Educate Vermonters about the responsibility and dangers associated with e-waste disposal.

III. Lead in the Environment

In addition to lead in consumer products, there are environmental sources of exposure that are important to consider because of the potential for any amount of lead in soil, water or air to affect, on a continuous basis, larger segments of the public than those people who come into contact with specific products. By the same token, health and behavioral effects associated with continuous exposures to lower levels of lead are not as visible as more dramatic severe poisonings and so result in less public attention.

A. Lead in Soil

Exterior soil is one of three media that the CDC lists as having high concentrations of lead and being a direct or indirect source of exposure for children.[159] The EPA has set standards for lead in soil at 400 parts per million (ppm) in bare soil in play areas, and 1,200 ppm average for bare soil in other areas of the yard.[160]

It is well documented that soil contamination is often found along the driplines of pre-1978 houses,[161] an issue addressed by the "Get the Lead Out of Vermont" Housing Committee. However, there are other sources and locations of lead-contaminated soil. For example, leaded gas has caused the accumulation of lead in soil near busy roadways and in trafficked areas.[162] Smelters and other industries using lead may have left contaminated soil in areas where new housing has since been built.[163] In rural areas, housing may be sited on land once

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[159] CDC, *Managing Elevated Blood Lead Levels* (n.5), ch. 2, http://www.cdc.gov/nceh/lead/CaseManagement/caseManage_chap2.htm. The other two media are paint and interior dust.
[160] 40 C.F.R. § 745.65.
[161] National Center for Healthy Housing, *Evaluation of the HUD Lead-Based Hazard Control Grant Program, Final Report* (May 1, 2004), http://www.centerforhealthyhousing.org/HUD_National_Evaluation_ Final_ Report.pdf, 4-14 (reporting mean perimeter soil concentration in samples from seven states, including Vermont, of 1,104 ppm); *Profile* (n.6), 307-310. According to Ron Rupp of the Vermont Housing Conservation Board, perimeter soil samples from pre-1950 homes commonly test at 1,000-1,500 ppm and frequently higher than that.
[162] H.W. Mielke, Lead's Toxic Urban Legacy and Children's Health, *Geotimes* (May 2005), http://www.agiweb.org/geotimes/may05/feature_leadlegacy.html.
[163] CDC, *Managing Elevated Blood Lead Levels* (n.5), ch. 2, http://www.cdc.gov/nceh/lead/CaseManagement/caseManage_chap2.htm.

occupied by apple orchards treated with the pesticide lead arsenate,[164] or by farm buildings painted with lead-based paint.

Some states are taking action in this area. Minnesota has tightened its standard for lead in bare soil to 100 ppm.[165] A study has been undertaken by the City of Portland, the University of Southern Maine and the Maine Department of Environmental Protection to test soil levels in several Portland neighborhoods; initial results show high lead levels in two neighborhoods with the study continuing in a third neighborhood.[166] Finally, at some Superfund or heavily polluted sites, mixtures of toxins can include soils with elevated lead levels, as in the case of the Copperas Factories at the Elizabeth Mine in Strafford, Vermont, for which the EPA has designed remedial action.[167]

In Vermont, the level of soil contamination in towns, cities, and rural areas is largely unknown because soil testing has focused on soil around pre-1978 housing and on known hazardous waste sites rather than on areas of new development. Nonetheless, it is likely that soil at certain industrial sites and land next to roadways, among other locations, contains elevated concentrations of lead. The potential for harm to Vermont's children may be significant, so this exposure pathway should be investigated further.

Recommendations

- Have the State undertake a joint project involving an academic institution or extension service, DEC and VDH to review existing Vermont soil studies and to conduct additional sampling to further assess and map the risk of lead exposure by contaminated soil; based on the results of this work, craft appropriate recommendations on soil testing and remediation in relation to the use of land to grow food, for children's recreation and for other potentially high-risk purposes.
- Require soil lead tests for new housing, at least where there is reason to believe that lead may be present.

B. Lead in Water

Now that lead in air has been greatly reduced due to the phase-out of lead in most gasoline, drinking water is probably the most widely recognized environmental source of exposure to lead. The EPA estimates that 10% to 20% of human exposure to lead may come from lead in drinking water. Infants who consume mostly mixed formula can receive 40% to 60% of their exposure to lead from drinking water.[168] The EPA and the ATSDR both assume that if a child is exposed to water containing more than 20 μg/L of lead, his or her blood lead level will

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[164] E. Hood, *The Apple Bites Back: Claiming Old Orchards for Residential Development*, 114 Environ. Health Perspectives, A471-476 (Aug. 2006).
[165] C.J. Rosen, *Lead in the Home Garden and Urban Soil Environment*, Univ. of Minn. Extension Service (2002), http://www.extension.umn.edu/distribution/horticulture/DG2543.html.
[166] A. Rigazio, Dirty dirt—Lead contamination citywide, *The Phoenix* (May 17, 2006), http://www.phx.com/article_ektid12602.aspx.
[167] EPA Superfund Program, *Superfund Program, Proposed Plan, Elizabeth Mine Superfund Site Strafford/ Thetford, VT* (June 2006), 5, 8, http://www.dartmouth.edu/~cehs/CAGsite/docs/EMineProposedPlan_DraftFinal_06-26-06.pdf.
[168] EPA, *Lead in Drinking Water, Basic Information*, http://www.epa.gov/OGWDW/lead/leadfacts.html.

consequently be elevated.[169] According to a 1981 survey, the estimated percent of lead in drinking water in the United States as a whole is summarized as follows:[170]

≤ 10μg/L	11-19μg/L	20-49μg/L	≥ 50μg/L
60%	24%	13%	3%

The DEC has accumulated data on the results of tap water tests required by the EPA for community water systems that exceed the action level set by the agency's Lead and Copper Rule ("LCR," see below). Of 7,688 samples taken between 2002 and 2005, 372 (4.8%) contained 15 ppb of lead or more; a total of 1,287 (16.7%) contained at least 5 ppb.

Distribution of First-Draw Lead Levels from Vermont Taps on Public Water Supplies

Lead Level	*Number*	*Percent*
None	4121	53.6%
> 0 < 5 ppb	2280	29.7%
≥ 5 <15 ppb	915	11.9%
≥ 15 ppb	372	4.8%
Total	*7688*	*100.0%*

The principal concern for exposure to lead in water consumed by Vermont residents arises from lead in the water *distribution* system—that is, between the line connecting a public water supply with a household unit and the tap. Although there has been some concern about old lead service lines and lead-based solder between a community's water mains and individual households, with age and use a stable surface may form inside of old pipes so they no longer release lead into the passing water. However, this does not resolve the issue of lead leaching from brass pipes, and from water meters and faucets that also contain lead.[171]

In this connection, in 1991, the EPA promulgated the LCR, 40 C.F.R. §§ 141.80 *et seq.*, under the federal Safe Drinking Water Act, 42 U.S.C. §§ 300f *et seq.* The rule established an "action level" of 15 parts per billion (also expressed as 15 μg/L or .015 mg/L) for the 90th percentile level of "first-draw" tap water samples. (First-draw samples reflect any lead buildup from contact between standing water and pipes and fixtures, which will typically be higher than "flush" samples.) The rule provides that if a system exceeds the action level, specified steps must be taken, including, as appropriate, water quality monitoring, public education, source water treatment and corrosion control treatment. The LCR is a practical measure to reduce lead in drinking water, not a health-based standard.

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[169] E. Millstone, *Lead and Public Health* (1999), 99, citing ATSDR, *The Nature and Extent of Lead Poisoning in Children in the United States* (1988), VI-40.

[170] *Ibid.*, 98, citing EPA, *Reducing Lead in Drinking Water: A Benefit Analysis*, 11-22 (1986).

[171] The problem may be compounded when water is boiled for cooking, concentrating the lead as some of the water is converted to steam vapor.

In January 2006, the federal General Accounting Office (GAO) issued a report on lead in drinking water.[172] Some of the problems with drinking water regulation highlighted in the report appear to be relevant to Vermont, including the fact that sampling sites may no longer reflect areas of highest risk,[173] and that homeowners who participate in sampling may not be notified of their test results. This last criticism, at least, would be remedied under changes proposed to the LCR in the summer of 2006.[174]

The GAO also criticized existing plumbing standards as outdated and ineffective. Specifically, products considered to be "lead-free" under the Safe Drinking Water Act can still contribute high levels of lead to drinking water. Solders and flux may contain up to 0.2% lead, and pipes and pipe fittings up to 8% lead. Fittings and fixtures may leach up to 11 ppb into drinking water and still be deemed lead-free; and there is no limit on lead leaching from in-line devices, such as meters and valves. GAO-requested testing showed lead leaching from these latter devices in amounts as high as 530 ppb. Moreover, some manufacturers have a low-lead line of products for customers who want those, and a higher-leaded line for others, and industry testing may underestimate amounts leached.[175]

Drinking Water also reports inadequacies in the effort to eliminate lead-contaminated water in schools and day care facilities under the Lead Contamination Control Act (LCCA) of 1988, 42 U.S.C. §§ 300j-21 *et seq.*, including limited information on both the results of a recall of lead-lined water coolers, and the extent of lead-contaminated water in schools. Lead levels in elementary schools and daycares are of particular concern because of the concentration in those facilities of young children, who face a higher risk than others of serious damage to health due to lead.

According to the EPA, citing DEC, in 1994 Vermont's voluntary testing program for lead in school drinking water had "very low participation." It is unclear what action, if any, was prompted by a mass mailing sent by the State to Vermont schools, reminding them of the need to monitor for lead in drinking water.[176] Drinking water in licensed childcare facilities is addressed through the licensing process.

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[172] GAO, *Drinking Water, EPA Should Strengthen Ongoing Efforts to Ensure That Consumers Are Protected from Lead Contamination* (GAO-06-148) (Jan. 2006) ("*Drinking Water*").

[173] The GAO noted that Vermont said it lacked the resources to ensure that water systems were taking samples at the correct locations. *Drinking Water*, 25, note b.

[174] EPA, *Revisions to the Regulations Controlling Lead in Drinking Water Fact Sheet* (June 2006), http://www.epa.gov/safewater/lcrmr/fs_lcr_2006_pro-rule.html.

[175] Also according to *Drinking Water* (n.173), 41, California sued and settled with 16 manufacturers and distributors of kitchen and bathroom faucets for a limit on lead leaching of 5 ppb for residential kitchen faucets and 11 ppb for all others; and the Massachusetts Board of State Examiners of Plumbers and Gas Fitters has established a 3% limit on the lead content of endpoint and in-line devices. As of June 2006, there was also a bill, AB 1953, pending in the California Legislature that would prohibit the use of plumbing fittings, fixtures, solder or flux containing more than 0.25% lead, http://info.sen.ca.gov/pub/bill/asm/ab_1951-2000/ab_1953_bill_20060614_amended _sen.pdf.

[176] EPA, *Controlling Lead in Drinking Water for Schools and Day Care Facilities: A Summary of State Programs* (July 2004). For information on steps that schools can take to address lead contamination in water, *see* EPA, *3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance*, http://www.epa.gov/safewater/schools/guidance.html.

Other less well-known factors have been cited as potentially increasing the amount or effects of lead absorbed from drinking water, including the effect of chemicals used in water treatment and the presence of radon, which can degrade to radioactive lead (lead 210).[177] Further study of these phenomena is warranted.

Recommendations

- Consider requiring the testing of tap water for lead prior to the sale of any residential property in Vermont, and the reporting of test results to prospective buyers.
- Undertake a public education program on the benefits of flushing water before use, in homes that may have lead in fixtures.
- Determine the level of lead in Vermont schools, assess practices related to flushing, and take appropriate steps to resolve any problems.
- Check for compliance with the LCR in terms of fixtures available on the market in Vermont, and consider tightening existing standards (including a consideration of the costs of identifying and replacing obsolete or dangerous pipes and fixtures).
- Notify homeowners whose water is tested under the LCR of their test results.
- Reevaluate which homes are targeted for purposes of testing under the LCR.
- Investigate the extent to which (1) the chemistry of lead-leaching from brass fixtures differs from leaching from lead elements such as solder, (2) the treatment of water with silicofluorides increases children's absorption of lead from environmental sources, and (3) radon in wells results in exposure to radioactive lead; and take appropriate action.
- Undertake further research on the extent of exposure to lead through water, including matching data on lead levels to specific communities and community water-treatment practices, with due allowance for other lead risk factors; and monitor Vermont water systems that use both chloramines and silicofluorides for increased corrosion of lead.

C. Lead in Air

The federal government's phase-out of lead in gasoline is one of the great environmental health success stories of the last century in this country. Up until 1988, automotive emissions were the number one source of lead emitted into the atmosphere in this country.[178] Since then, industrial processes in the U.S. have significantly surpassed vehicles as sources of air emissions of lead, with the highest concentrations usually found near smelters and battery manufacturers.[179]

In Vermont, there are few significant industrial sources of lead emissions. For the year 2004, the EPA's Toxic Release Inventory ("TRI") listed lead emissions from only 6 facilities in

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[177] R.D. Masters and M.J. Coplan, Water Treatment with Silicofluorides and Lead Toxicity, 56 *Intern. J. Environ. Studies*, 435-449 (1999); R.D. Masters, M.J. Coplan, B.T. Hone and J.E. Dykes, Association of Silicofluoride Treated Water with Elevated Blood Lead, 21 *NeuroToxicology*, 1091-1100 (2000); R. Graeub, *The Petkau Effect* (1994).

[178] *Profile* (n.6), 284. For evidence of substantial benefits associated with the ban on leaded gasoline, see R. D. Masters, Biology and Politics: Linking Nature and Nurture, 4 *Ann. Rev. of Pol. Sci.*, 352-356 (2001).

[179] EPA, *Air Trends, More Details on Lead—Based on Data Through 2002,* http://epa.gov/airtrends/lead2.html.

Vermont, and only one whose release exceeded 4 pounds.[180] This TRI data includes process and fuel combustion estimates, and does not include all source categories. The Vermont Air Pollution Control Division's ("APCD") registration database for 2004 lists an additional 7 sources of lead from process emissions, with all facilities totaling 3.6 pounds of lead per year. These estimates from the Vermont APCD do not include fuel combustion from industrial sources, nor home heating emissions.[181] Because these latter sources are not tracked, total statewide emissions of lead cannot be reliably estimated.

There are facilities just outside of Vermont's borders that release lead into the atmosphere, including the International Paper plant in Ticonderoga, New York.[182] Vermont is constrained in its ability to enact legislation or to promulgate regulations to achieve reductions in lead emissions from sources located outside Vermont's borders. Nonetheless, these emissions may affect Vermont's air quality.

Lead emission standards are currently undergoing review by both the EPA and the State of Vermont. National Ambient Air Quality standards (NAAQs) for lead are set by the EPA at a maximum quarterly average of 1.5 $\mu g/m^3$[183] and then further restricted by the current state standard of 0.25$\mu g/m^3$ maximum quarterly average.[184] The NAAQs for lead were set in 1978. The Clean Air Act mandates review of all criteria pollutants, including lead, every five years and then the updating of those standards as appropriate.[185] Lead NAAQs were reviewed, but not amended, by the EPA in 1986 and again in 1990. The result has been an industrial processes lead emission reduction of only 6% since 1988.[186]

In response to more recent research on the toxicological effects of lead exposure, the EPA commenced review of the current air quality criteria for lead in November of 2004.[187] Since then, two external review drafts have been released and a date set for the release of a more

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[180] The TRI-listed facilities were Ethan Allen, Inc., Beecher Falls Division, in Essex (4 pounds); Ethan Allen, Inc., Orleans Division, in Orleans (3 pounds); GE Company in North Clarendon (16 pounds); IBM Corporation in Essex Junction (1 pound); Nexus Custom Electronics Corporation in Brandon (2 pounds); and Rock-Tenn Converting Company in Sheldon Springs (2 pounds). TRI Explorer, *Releases: Facility Report*, http://www.epa.gov/cgi-bin/broker?view= STFA&trilib=TRIQ1&sort=_VIEW_&sort_fmt=1&state=50&county=All+counties&chemical=007439921&chemical=N420&industry=ALL&year=2004&tab_rpt=1&fld=RELLBY&ONDISPD=Y&OTHDISPD=Y&fld=TSFDSP&OFFDISPD=Y&OTHOFFD=Y&_service=oiaa&_program=xp_tri.sasmacr.tristart.macro.

[181] Email from Heidi Hales, Air Toxics Coordinator, Air Pollution Control Division, DEC, to Elliot Burg (Sept. 21, 2006) ("Hales").

[182] Emissions from the International Paper plant in 2002, 2003 and 2004, totaled 618, 611 and 618 pounds, respectively. EPA, *TRI Explorer*, http://www.epa.gov/triexplorer/facility.htm.

[183] 40 C.F.R. § 50.12.

[184] Vermont Agency of Natural Resources, *Air Pollution Control Regulations*, sec. 5-310, http://www.anr.state.vt.us/air/AirToxics/docs/apcregs.pdf.

[185] 42 U.S.C. § 7409(d)(1).

[186] EPA, *EPA's Efforts to Reduce Lead; Focusing on Industrial Sources*, http://www.epa.gov/air/urbanair/lead/effrt.html.

[187] EPA, *Air Quality Criteria Document for Lead* (July 15, 2005), http://www.epa.gov/fedrgstr/EPA-MEETINGS/2005/July/Day-15/m14059.htm.

current Lead Air Quality Criteria Document; the public comment period for the second external review draft closed on June 27, 2006.[188]

Vermont has also proposed revised Hazardous Ambient Air Standards (HAAS) for lead. A proposed regulation reclassifies lead and lead compounds as Category I contaminants, thereby reducing the HAAS from a 0.25 $\mu g/m^3$ three-month average to an annual average of 0.01$\mu g/m^3$.[189] Reclassification would deem lead to be a known or suspected carcinogen justifying the more stringent and protective standard.[190] Promulgation of a lower HAAS better protects human health and the environment and restricts levels of particulate lead in the air to a degree that is already being achieved in Vermont.

In 2005, the average lead concentration for the PM2.5 (particles less than 2.5 microns in diameter) fraction reported by the monitoring site in Burlington was 0.003 $\mu g/m^3$, substantially below the projected standard.[191] However, currently the APCD does not monitor for total lead concentrations, so it is not clear if the current standard is being exceeded.

DEC has also proposed regulating outdoor wood boilers (OWBs), which can be significant local sources of pollution, including lead. Currently OWBs are neither monitored nor certified by the EPA. However, OWBs emit far more particulate matter than other energy sources on an average per-hour basis.[192] Vermont began regulating OWBs in 1997, placing some limits on the use, location, installation and stack height of these backyard devices.[193] While these regulations address only the impact of smoke from boilers and not the emission of specific pollutants, a rule amendment has been proposed that would require an OWB manufacturer to establish through testing that the device complies with emission limits prior to sale.[194]

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[188] EPA, *Draft Air Quality Criteria for Lead, Notice of Public Comment Period on a Second External Review Draft*, 71 Fed. Reg. 29152 (May 19, 2006), http://www.epa.gov/fedrgstr/EPA-AIR/2006/May/Day-19/a7647.htm.

[189] DEC, *Proposed Regulations*, http://www.anr.state.vt.us/air/htm/ProposedAmendments.htm.

[190] DEC based its classification on information from the EPA and the International Agency for Research on Cancer ("IARC"). Hales; *see* EPA, Integrated Risk Information System, *Lead and compounds (inorganic)*, http://www.epa.gov/iris/subst/0277.htm; IARC, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, http://monographs.iarc.fr/ENG/Classification/crthgr02a.php; *see also* National Toxicology Program, *Report on Carcinogens*, section on Lead and Lead Compounds (lead and lead compounds are "*reasonably anticipated to be human carcinogens*" [italics in original]), http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s101lead.pdf.

[191] EPA, *AirData, Monitor Values Report—Hazardous Air Pollutants*, http://iaspub.epa.gov/airsdata/adhap.monvals?geotype=st&geocode=VT&geoinfo=%3Fst%7EVT%7EVermont&pol=88128&year=2005&fld=monid&fld=address&fld=city&fld=county&fld=stabbr&fld=regn&rpp=25.

[192] N.Y. Attorney General's Office, Environmental Protection Bureau, *Smoke Gets in Your Lungs: Outdoor Wood Boilers in New York State* (Aug. 2005), http://www.woodheat.org/technology/NYSOBreport.pdf ("Even when used properly, OWBs emit, on an average per hour basis, about four times as much fine particulate matter pollution as conventional wood stoves, about 12 times as much fine particle pollution as EPA-certified wood stoves, about 1000 times more than oil furnaces, and 1800 times more than gas furnaces.").

[193] DEC, *Air Pollution Control Regulations, Standards for Outdoor Waterstoves*, Sec. 5-204, http://www.vtwoodsmoke.org/pdf/OWBrule04.pdf. New York State has proposed similar regulation. *See State Legislation Introduced to Reduce Air Pollution from Outdoor Wood Boilers* (press release from Assemblywoman Donna Lupardo, Apr.13, 2006), http://www.vtwoodsmoke.org/pdf/NYOWB4-06.pdf.

[194] DEC, *Proposed Regulations, Outdoor Wood-fired Boilers—Emission Limits,* http://www.anr.state.vt.us/air/docs/OWB%20Proposed%20Regulation%2020050728%20Annotated.pdf.

Recommendations

- Promulgate DEC's proposed air quality and OWB regulations.
- If there are any other significant potential sources of lead emissions into the air, consider regulating them as well.[195]
- Support DEC in compiling a lead inventory for Vermont.

IV. Occupational/Take-Home Lead

A significant number of occupations have a high potential for lead exposure. Without appropriate safety and hygiene at the workplace, this occupational exposure can lead to take-home exposure for children and other family members. Although the data are limited, all studies point to greater concentrations of lead dust in the cars and homes of workers exposed to lead on the job,[196, 197] and to a higher rate of elevated blood lead levels among families of workers who are lead-exposed[198] or families of workers whose BLLs are 10 μg/dL or greater.[199] In California, lead exposure was investigated in 39 workplaces from 1992 to 2002 with 51 workers who themselves had BLLs of 10 μg/dL or greater. "In total, 74 household members ranging in age from newborn to 28 years were linked to the 51 workers ... and had BLLs ranging from 10 to 52 μg/dL. The majority (83%) were children under 6 years of age."[200] Take-home statistics in Michigan also show a high correlation between workers with BLLs of 10 μg/dL or greater and a significant rate of elevations among children in their households.[201]

Although the CDC's National Institute for Occupational Health (NIOSH) established the Adult Blood Lead Epidemiology Surveillance (ABLES) program to assist states with surveillance and reporting of adult BLLs, Vermont is one of 12 states that do not participate in the ABLES Program.[202] Because of this, there are no reported data on the actual numbers of adults in the state with elevated BLLs.

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[195] For example, the current reporting threshold for lead and lead compounds requires only manufacturers, processors and users of lead and lead compounds who employ 10 or more employees, operate in certain industrial sectors, and produce, import, process or use at least 100 pounds of lead, to report to the EPA on toxic chemical releases. 40 C.F.R. §§372.22 and 372.28.

[196] G.M. Piacitelli, E.A. Whelan, L.M. Ewers and W.K. Sieber, Lead Contamination in Automobiles of Lead-Exposed Bridgeworkers, 10 *App. Occup. Environ. Hygiene*, 849–855 (Oct. 1995).

[197] G.M. Piacitelli, E.A. Whelan, W.K. Sieber and B. Gerwel, Elevated Lead Contamination in Homes of Construction Workers, 58 *Am. Indep. Hygiene Assoc. J.*, 447–454 (June 1997).

[198] R.J. Roscoe, J.L. Gittleman, J.A. Deddens, M.R. Petersen and W.E. Halperin, Blood lead levels among children of lead-exposed workers: A meta-analysis, 36 *Am. J. Indep. Med.*, 475–481 (Oct. 1999).

[199] K.L. Hipkins, B.L. Materna, S.F. Payne and L.C. Kirsch, Family Lead Poisoning Associated with Occupational Exposure, 43 *Clinical Pediatrics*, 845–849 (2004).

[200] *Ibid.*

[201] *2004 Annual Report on Blood Lead Levels in Michigan*, Table 20, http://oem.msu.edu/Lead/04Lead_AnnRpt_all.pdf.

[202] NIOSH, *Adult Blood Lead Epidemiology Surveillance (ABLES), State-Based Programs*, http://www.cdc.gov/niosh/topics/ABLES/ables-state-based.html.

In 1995, 23 participating ABLES states reported 12,664 adults with BLLs greater than 25 μg/dl.[203] However, estimates from the Third National Health and Nutrition Examination Survey (NHANES III) suggest that as many as 700,000 adults nationwide may have BLLs above 25μg/dl.[204] The large discrepancy between the ABLES and NHANES numbers is likely due to the lack of medical monitoring of employees exposed to lead.[205]

By way of example, OSHA has promulgated national occupational standards on lead.[206] When the California Department of Health studied compliance by residential painters with the OHSHA lead in construction rule, it found the following:

> Results indicated that the pre-intervention worker protection programs among the participating contractors were generally lacking and that contractors were poorly informed about the requirements of the OSHA construction lead standard. A substantial proportion (37 percent) of contractors did not test for the presence of lead at the work site. High-risk paint removal methods, including dry scraping, dry sanding, power sanding without local exhaust ventilation (LEV), open flame torch burning, and heat gun, were often used. The contractors rarely performed lead exposure assessment or medical monitoring—only one of the 22 painting contractors had ever assessed employee airborne lead exposures, and only two did routine BLL monitoring of employees. Many contractors indicated that they did not provide workers any lead safety training, the proper type of respirators or respiratory programs, or protective work clothing.[207]

It is reasonable to assume that the same lack of compliance occurs among Vermont employers, and that construction workers in Vermont are being exposed to lead. In fact, given the number of small, independent businesses in the state, it is often difficult to ensure that affected businesses are even familiar with the national standards.[208] In addition, there is no official registry of contractors in Vermont, complicating efforts at outreach, education, and enforcement of the lead in construction rule.

In Vermont, five companies report on their lead emissions to DEC: Fulflex, GE (two locations), Vermont Air Guard, Belden Wire & Cable, and CFM Stove Group (Vermont Castings).[209] These five companies are all potential sources of worker exposure, and without proper safety and hygiene practices in place, could also be sources of take-home exposure.

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[203] NIOSH, *Protecting Workers Exposed to Lead-based Paint Hazards, A Report to Congress* (Publication no. 98-112) (Jan. 1997), ch. 2, http://www.cdc.gov/niosh/c2-98112.html ("*Protecting Workers*").
[204] CDC, Adult Blood Lead Epidemiology and Surveillance—United States, Second and Third Quarters, 1998, and Annual 1994-1997, 48 *MMWR* 213-216 (Mar. 19, 1999), http://www.cdc.gov/MMWR/preview/mmwrhtml/00056742.htm.
[205] *Ibid.*
[206] 29 C.F.R. §§ 1910.1025 (setting permissible exposure limits for lead in the workplace) and 1926.62 (setting permissible exposure limits for lead in the construction industry).
[207] *Protecting Workers.*
[208] Email from Scott Meyer, Program Manager, Project WorkSAFE, Vermont Department of Labor, to Elliot Burg (May 22, 2006).
[209] Email from Heidi Hales, DEC, to Elliot Burg (Apr. 24, 2006).

There are many other businesses where lead exposure can be an issue, notably the construction trades. Lead abatement companies must be licensed through the Vermont Department of Health's Lead and Asbestos Regulatory Program, but the occupational categories with a high potential for take-home exposure go far beyond construction, as noted in this list from the California Department of Health Services:[210]

Occupations and Hobbies with High Potential for Take-Home Exposure

Automobile
Auto body painting
Auto body repair
Auto dismantler
Automobile or truck assembly
Battery manufacturing
Battery recycling
Battery repair
Radiator manufacturing
Radiator repair

Construction
Abrasive blasting
Lead paint or asbestos abatement
Plumbing
Renovation/remodeling buildings/metal structures
Salvaging/wrecking/torch cutting structures
Welding, riveting, or building metal structures

Firearms
Bullet, explosive, or flare manufacturing
Firearms manufacturing, repair, or shooting

Hobby
Boat repair
Casting lead, e.g. fishing sinkers or bullets
Firearms making, repair, shooting
Jewelry making
Painting parts of the house or furniture
Painting pictures with artist's paint
Salvage or wrecking buildings/metal structures
Soldering of any kind (pipes or electronics)
Stained glass work
Welding or torch cutting
Working with bullets, shot, explosives, fireworks
Working with ceramics or pottery
Working with glass, crystal, glazes, glass frit

Metal Working
Cable/wire manufact'g, recycling, splicing, repairing
Galvanizing operations
Lead burning
Machinist
Metal casting, forging, or other foundry work
Metal grinding, polishing or buffing
Metal heat treating/quenching/annealing
Metal mining
Metal smelting or refining
Metal worker (general)
Plating or electroplating
Scrap metal processing or recycling
Soldering, brazing or tinning
Working with brass or bronze

Miscellaneous
Adhesive or sealant manufacturing
Aircraft part manufacturing
Industrial cleaning operations
Ink, dye, or pigment use or manufacturing
Linotype printing
Plating or electroplating
Electrical supply manufacturing
Porcelain/pottery/ceramics manufacturing
Rubber or plastic manufacturing
Shipbuilding, repairs, or salvage
Working with glaze, crystal, or glass
X-ray machine manufacturing

Painting
Paint manufacturing
Painting or paint removal

[210] CLPPB PHN Case Management Guidance Manual (Mar. 17, 2005).

Three Cases of Occupational Exposure[211]

Patient 1: Exposure from Battery Repair

On reading a magazine article about lead causing behavior and learning problems, a mother recognized similar difficulties in her 6-year-old son and requested testing. His BLL was 36 μg/dL. Follow-up BLLs for the mother and father were 18 and 121 μg/dL, respectively. The father's occupation in battery repair for more than 4 years was the sole identified source of the family's lead exposure. His work involved melting, casting and soldering lead without proper protections. He wore his work clothes home. Three co-workers had BLLs ranging from 26 to 52 μg/dL; none had prior testing.

Both child and father had multiple signs and symptoms of chronic lead poisoning and suffered significant, permanent neurologic damage. The child needed ongoing specialized medical care and schooling. The father was removed from work and at last report remained unemployed. The employer resisted making required workplace improvements and was cited for numerous violations by OSHA.

Patient 2: Exposure from Firing Range Demolition

A laborer requested a lead test on his third day on a firing range demolition job when he was seen in the emergency room for a work-related injury; his BLL was 74 μg/dL. Workers were not told that lead was present on the job; they lacked proper protections and wore their heavily contaminated work clothes home.

Subsequent BLLs for 4 co-workers ranged from 57 to 98 μg/dL; the worker with the highest BLL was on the job the longest, at 2 weeks. None reported prior work with lead. Nine children, aged 18 months to 12 years, of 3 workers had BLLs ranging from 13 to 34 μg/dL; the youngest child had the highest BLL. One spouse, who handwashed her husband's work clothes, had a BLL of 36 μg/dL. No other lead source was identified.

Patient 3: Exposure from Scrap Metal Recycling

A worker in scrap metal-recycling saw his personal physician for muscle pains of a few months' duration. His BLL was 37 μg/dL. He went home twice daily in his work clothes. His 10-month-old child's BLL was 26 μg/dL. The worker informed his employer; 16 co-workers were tested. In all, 10 of 17 workers had BLLs $\geq$ 40 μg/dL (2 > 60 μg/dL); 7 had BLLs ranging from 26 to 39 μg/dL. Five workers each had a child ranging in age from 8 months to 2 years with BLLs of 14 to 26 μg/dL. In total, 22 individuals were identified with significant lead exposure.

The work involved cutting and bailing lead-sheathed cable. The company relied on initial air monitoring with low airborne lead levels of 2 micrograms per cubic meter (μg/m³) and did not implement a lead safety program. Repeat air-monitoring results were up to 240 μg/m³; all workers cutting cable were exposed to air levels above the OSHA Permissible Exposure Limit of 50 μg/ m³.

[211] K.L. Hipkins *et al.*, Family Lead Poisoning Associated with Occupational Exposure, 43 *Clinical Pediatrics*, 845–849 (Nov./Dec. 2004).

Recommendations

- Gather more data on the nature and scope of Vermont businesses in which lead exposure is an issue.
- For the purpose of ensuring compliance with the lead in construction rule, undertake state participation in ABLES, create a registry of contractors, and increase resources for state enforcement.
- Undertake an education campaign for adults who work with lead and may not be aware of its dangers.
- Add information about take-home lead to the DEC's Environmental Assistance Program website.[212]

V. Responses of Other Jurisdictions

Some regulatory measures relating to "other exposures" have been taken by the federal government, other states and the international community, but these do not address the issue comprehensively.

A. Federal Regulation and Preemption

Historically, the federal government has taken a laissez-faire approach toward regulating chemicals such as lead in consumer products. The breadth of federal legislation and administrative regulations has focused primarily on banning lead in paint and gasoline and reducing/monitoring lead emissions and discharges into the nation's air and water bodies through the Clean Air Act and Clean Water Act. There is significantly less regulation concerning lead in consumer products.[213] Federal statutes and rules span a number of different regulatory agencies and encompass a varying emphasis on exposure rates, accessibility to lead, and appropriate action levels for lead poisoning indicators such as BLLs.[214]

As noted in the chart below, most of these laws include a provision that allows states to regulate chemicals, consumer products, air and water more restrictively than the federal regulations. The federal government will typically not preempt a state law or regulation that deals with one of the previously specified media unless that law or regulation attempts to regulate the medium at a lower level than the federal guidelines. Most notably, states have been allowed to restrict the manufacturing, use and sale of products containing chemicals such as mercury without any federal interference to date.

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[212] DEC, *Compliance Assistance Resources,* http://www.eaovt.org/sbcap/resources.htm.

[213] "Currently, there are no regulations banning the use of lead, even in children's products." *Playing With Poison: Lead Poisoning Hazards of Children's Product Recalls 1990-2004,* Kids-in-Danger Report (2004).

[214] The CPSC considers eight major factors when deciding if a product is hazardous due to lead content: the total amount of lead contained in a product, the bioavailability of the lead, the accessibility of the lead to children, the age and foreseeable behavior of children exposed to the product, the foreseeable duration of the exposure, the marketing of the product, the patterns of use and the life-cycle of the product. *Guidance for Lead* (n.21).

The following table identifies the specific agency with oversight to regulate exposure to lead in a particular medium; the applicable law that enables this oversight; the agency's approach to regulating lead in that particular medium; and any pertinent information on preemption or lack thereof.

Federal Regulatory Oversight by Source Category

Consumer Products

Legal Authority	*Agency*	*Regulates*	*Preemption*
Consumer Product Safety Act, 15 U.S.C §§ 2051 *et seq.*	Consumer Product Safety Commission (CPSC)	Authorizes the CPSC to ban household products that pose an unreasonable risk of injury, and requires certain packaging and labeling. The CPSC has banned "household products that expose children to hazardous quantities of lead ... as well as toys or other articles intended for use by children which contain a hazardous amount of lead that is accessible for children to ingest," 16 C.F.R. § 1500 *et seq.*,[215] and recalls consumer products that are deemed hazardous (a product is typically deemed hazardous if its composition contains 0.06%, or 600 ppm of lead), 16 C.F.R. §§ 1303 *et seq.* Manufacturers are urged to eliminate lead in consumer products.[216]	Where a consumer product safety standard is in effect, inconsistent state laws (other than those relating to a consumer product for the state's "own use") are preempted, unless an exemption is granted by the CPSC. *See* 15 U.S.C. § 2075(a)-(c).
Federal Hazardous Substances Act, 15 U.S.C. §§ 1261 *et seq.*	CPSC	Prohibits introduction into interstate commerce of any banned hazardous substance or any hazardous substance without a sufficient precautionary label indicating hazards and directions for use.	State labeling requirements are preempted (except for substances for the state's "own use"), unless an exemption is granted. *See* 15 U.S.C. § 1261, note (b).
Interim Enforcement Policy for Children's Metal Jewelry Containing Lead[217]	CPSC	Prohibits the sale of children's jewelry if any component of the jewelry contains greater than 0.06% lead by weight or 600 ppm of lead in the product's composition. *See* 16 C.F.R. §§ 1303 *et seq.*	*See* above.
Toxic Substances Control Act, 15 U.S.C. §§ 2601 *et seq.*	Environmental Protection Agency (EPA)	Requires testing to assess "unreasonable risk of injury to health or the environment" for new chemicals, new uses of chemicals, and chemicals for which there is insufficient data to control the manufacture, distribution and sale of toxic substances.	Where a rule or order is in effect, inconsistent state laws are preempted, unless an exemption is granted by the EPA. *See* 15 U.S.C. § 2617(a)-(b).
The Federal Food Drug and Cosmetic Act, 21 U.S.C. §§ 301 *et seq.*	Food and Drug Administration (FDA)	Regulates the manufacture, distribution and sale of food, drugs and cosmetics. The FDA prohibits some specific products like tin-coated lead foil capsules on wine bottles and lead-solder cans. Action levels and industry guidance are established for ceramic ware, glassware, calcium products, hair dyes and foreign digestive remedies.[218]	A number of types of state labeling requirements for food are expressly preempted. *See* 21 U.S.C. § 343-1.
The Fair Packaging and Labeling Program, 15 U.S.C. §§ 1451-61.	FDA	Consumer commodities must be packaged and labeled in accordance with specific regulations prior to distribution. *See* 15 U.S.C. § 1453, and food packaging regulations at 21 C.F.R. § 1(B)101.	Preempts less stringent state laws or those that require different labeling than that required under § 1453. *See* 15 U.S.C. § 1461.

[215] *See also Guidance for Lead* (n.21).
[216] *Ibid.*
[217] http://www.cpsc.gov/BUSINFO/pbjewelgd.pdf (Feb. 3, 2005).
[218] *Dangers of Lead* (n.60).

Lead in Candy Likely to be Consumed Frequently by Small Children: Recommended Maximum Level and Enforcement Policy, Draft Industry Guidance Document[219]	FDA	Candy with lead-based printing inks on the portion of the package that directly contacts food, or could be expected to migrate into the packaged food, will likely be regarded in violation of the Federal Food, Drug, and Cosmetic Act.	*See* above.

Air

Clean Air Act, 42 U.S.C. §§ 7401 *et seq.*	EPA	Regulates air emissions from area, stationary and mobile sources. Lead has a regulated emission limit based on State Implementation Plans.	States may adopt air emission standards, 42 U.S.C. § 7416, except with respect to motor vehicle emissions, 42 U.S.C. § 7543(a), motor vehicle fuels or fuel additives, 42 U.S.C. § 7545(c)(4), and aircraft emissions 42 U.S.C. § 7573.

Water

Clean Water Act, 33 U.S.C. §§ 1251 *et seq.*	EPA	Regulates the amount of allowable lead within a waterway. Action levels established for the amount of lead within public water supplies under the Lead and Copper Rule, 40 C.F.R. §§ 141.80 *et seq.*	No, more stringent state laws are expressly permitted. *See* 33 U.S.C. § 1370.

Occupational Exposure

Occupational Safety and Health Act, 29 U.S.C. §§ 651 *et seq.*	Occupational Safety and Health Administration (OSHA)	Requires labeling of hazardous chemicals in the workplace.	States may assert jurisdiction over issues lacking federal OSHA standards (per § 655); states are also empowered to regulate on matters where OSHA has set standards, provided they develop plans approved by OSHA that "will be at least as effective in providing safe and healthful employment and places of employment" as the federal standards. *See* 29 U.S.C. § 667(a)-(c).
OSHA Air Contaminant Standards, 29 C.F.R. § 1910.1025	OSHA	Sets permissible exposure limits for lead in the workplace.	*See* above.

[219] *Candy Guidance* (n.46) ("FDA is recommending that lead levels in candy products likely to be consumed frequently by small children not exceed 0.1 ppm because such levels are achievable under good manufacturing practices and would not pose a significant risk to small children for adverse effects."). The FDA explicitly states that "this guidance is not a rule. It is intended to highlight certain obligations under the Federal Hazardous Substances Act."

Safety and Health Regulations for Construction, Occupational Health and Environmental Control, 29 C.F.R. § 1926.62	OSHA	Sets permissible exposure limits for lead in the construction industry.	*See* above.
OSHA Hazard Communication Standard, 29 C.F.R. § 1910.1200	OSHA	Warns workers of hazardous chemicals and their effects.	*See* above.
Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001 *et seq.*	EPA	Requires facilities that store, use, release, dispose or transfer chemicals to document, notify and report information to state and local officials who are to create emergency plans for their communities.	No, generally does not preempt state law. *See* 42 U.S.C. § 11041.
Toxic Substances Control Act, 15 U.S.C. §§ 2601 *et seq.*	EPA	The EPA has established testing and information-gathering requirements for manufacturers of new and existing chemicals before they can be released onto the market.[220] 40 C.F.R. §§ 700 *et seq.*	Where a rule or order is in effect, inconsistent state laws are preempted, unless an exemption is granted by the EPA. *See* 15 U.S.C. § 2617(a)-(b).

Other

Residential Lead-Based Paint Hazard Reduction Act of 1992, 42 U.S.C. §§ 4851 *et seq.* and 15 U.S.C. §§ 2601 (toxic substances control)	Housing and Urban Development (HUD)	Creates national strategy for lead reduction, including disclosure standards, federal housing policy, abatement training and grants.	Authorized state programs may enforce, 15 U.S.C. § 2684(a); states may also impose more stringent requirements, 15 U.S.C. § 2684(e).

B. State Regulation

The primary focus of state-enacted legislation has been to target the use, sale and cleanup of lead paint, and to regulate lead in air and water resources pursuant to federal legislation. Some states also have limited prohibitions on lead in consumer products—for instance, toys and other items likely to be used by children, but only if they contain lead-based paint (Arizona, Kentucky, Louisiana, Maine and Massachusetts); and toys, tableware and art supplies contaminated with lead (California). States have generally deferred to federal authorities in regulating lead in consumer products.[221]

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[220] *See also* EPA, *Civil Enforcement, TSCA Statute, Regulations & Enforcement* (2006), http://www.epa.gov/compliance/civil/tsca/tscaenfstatreq.html.

[221] Illinois has recently enacted a law that incorporates the CPSC's lead-in-jewelry standard of .06% lead by total weight in or on any item intended for use by children; items that are coated with lead (more than 1 milligram per square centimeter) are prohibited as well. The statute further prescribes warning language for items not already labeled pursuant to federal law, and both criminal and civil penalties are authorized. *See* HB4853 (amending definition of "lead bearing substance" in 410 ILCS 45/2 sec. 2). New York is considering a similar measure, Bill A07726, sec. 2, and has also enacted a statute that authorizes the state's commissioner of health to set, in the

Another state legislative approach has been adopted by California in its "Proposition 65"—namely, to inform citizens about the toxicity of chemicals found in products through mandatory labeling.[222] Specifically, California law requires the state to create a list of those chemicals scientifically deemed hazardous.[223] Businesses must then provide a "clear and reasonable" warning before knowingly and intentionally exposing anyone to a listed chemical.[224] The notion behind labeling these products is that "[b]y providing this information, Proposition 65 enables Californians to make informed decisions about protecting themselves from exposure to these chemicals."[225] Lead has been a chemical requiring labeling since the first list was published back in 1987 and continues to be a topic of concern because of the recent findings of hazardous amounts of lead in children's jewelry.

It is true that because many products containing lead come from outside the United States, individual states may find it difficult to regulate them; this is especially the case for a small state like Vermont. Nonetheless, some states (and the international community, discussed below) are shifting to chemical identification systems that will provide information on the risks posed by chemicals such as lead, and are identifying ways to reduce or eliminate the use of these chemicals in consumer products.

For example, Maine's "Strategic Plan for Eliminating Childhood Lead Poisoning" includes provisions to systematically identify and analyze consumer products and other sources that have been found to or may contain lead, and to inform citizens of these sources to reduce the use and purchase of these products.[226] To achieve these goals, the state has taken a reasonable, staggered timeline approach that spans four years, which began on January 1, 2006, and aims to reach the target objective for that year.[227] The plan establishes a partnership among governmental agencies, including the Department of Human Services' Childhood Lead Poisoning Prevention Program, and community leaders and organizations.

Although there is no comprehensive prohibitory legislation on lead in consumer products in Vermont, a comparable area of regulation of a toxic chemical in consumer products is the state's recently enacted law on mercury in consumer products.[228] Because of the similarities between mercury and lead, this law serves as a model for how Vermont can work toward the reduction of, and the elimination of citizen exposure to, lead.[229]

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absence of a federal standard, a maximum quantity of lead that may be released from ceramic ware or other consumer products. *See* N.Y. Pub. Health Law § 1376-a.

[222] Proposition 65 was a voter initiative that became the Safe Drinking Water and Toxic Enforcement Act of 1986. The warning requirement is set out in Cal. Health & Safety Code § 25249.6.

[223] California Office of Environment Health Hazard Assessment, *Proposition 65 in Plain Language!* (2003), http://www.oehha.ca.gov/prop65/background/p65plain.html.

[224] *Ibid.*

[225] *Ibid.*

[226] Maine Depart. of Human Services, Childhood Lead Poisoning Prevention Program, *Strategic Plan for the Elimination of Childhood Lead Poisoning In Maine*, 28-30, http://mainegov-images.informe.org/dhhs/eohp/lead/FinalEliminationPlan.pdf.

[227] For example, a "Year 2 Objective" is to "create and make available to the public consumer guide [sic] on lead and other toxins in consumer products." *Ibid.*, 29.

[228] 10 V.S.A. § 7105 (2005) (restrictions on sale and use of certain mercury-added products).

[229] Both lead and mercury are heavy metals found to be toxic at low doses, persistent in the environment, and bioaccumulate in human and animal tissue. *See* the section on "PBTs" below, for a further discussion of these types of chemical substances.

C. *International Regulation*

Segments of the international community have taken a larger and more precautionary approach to reducing known and unknown toxic substances in consumer products. Most notably, the European Union (EU) is currently initiating a number of new directives and programs aimed at systematically identifying and reducing the use of such chemicals. These programs include the "Registration, Evaluation, and Authorization of Chemicals Program," or REACH[230]; the directive on "Waste Electrical and Electronic Equipment," or WEEE[231]; and the directive on the "Restriction of Hazardous Substances in Electrical and Electronic Equipment," or RoHS.[232] These programs reflect the changing global market and offer potential models for action.

While Vermont on its own may find it challenging to implement programs similar to the EU's, the state should support the mounting international pressure to clean up the use of toxic chemicals in consumer products. Because this identification-and-removal approach may reflect the direction in which the global market is heading, Vermont should position itself as a leader of consumer product protection by enacting precautionary legislation on the use of lead in consumer products.

VI. Other Topics

A. *A Precautionary Approach to Lead*

The "precautionary principle" states that "[w]here an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."[233] This policy approach has gained wide support among many in the scientific, medical, policy and legal communities.[234] It has already been used in numerous cases around the country to reduce the public's exposure to harmful toxins.[235] Robert Percival explains that the precautionary principle is "neither

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[230] The proposed REACH program is an attempt to create a central database of all large-scale importation of potentially harmful or suspicious chemicals. The thrust of the program is to take a proactive approach that places a greater responsibility on industry to manage the risks chemicals pose to human health and the environment. Europa (European Union website), *Environment, Workshop: REACH Implementation Project 3—Development of REACH Guidance for Industry*, http://europa.eu.int/comm/environment/chemicals/reach.htm.

[231] The WEEE directive, effective August 2005, "requires producers to recover and reuse electrical and electronic waste." M. Wilson, D. Chia and B. Ehlers, *Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation*, California Policy Research Center (Univ. of Calif. Berkeley, 2006), 61, *see* http://europa.eu.int/comm/environment/waste/weee_index.htm.

[232] "In July, 2006, the RoHS directive will prohibit the use of certain toxic materials in new electronics products sold in the E.U., including lead, mercury, cadmium, and hexavalent chromium." M. Wilson *et al.*, 61-62.

[233] Wingspread Statement on the Precautionary Principle (Jan. 1998), http://www.gdrc.org/u-gov/precaution-3.html.

[234] R. Percival, Who's Afraid of the Precautionary Principle?, 23 *Pace Environ. L. Rev.* 21 (2006). The most widely supported definition of the precautionary principle was established during the 1992 Earth Summit in Rio de Janeiro. The members of the Summit declared, "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." *Ibid.*, 25.

[235] *Ibid.*

incoherent, paralyzing, nor a prescription for overregulation," but instead "cautions that regulatory policy should be pro-active in ferreting out potentially serious threats to human health and the environment, as confirmed by the history of human exposure to substances such as lead and asbestos."[236]

A precautionary approach to lead exposure is warranted because there is no known level of lead exposure that can be considered "safe" for humans. Put another way, because of the known risks posed by lead and the scientific consensus that there is no acceptable level of lead in the human body, a precautionary regulatory approach appears to be justified in order to protect the citizens of Vermont from harm.

B. Lead and Other Persistent Bioaccumulative Toxins (PBTs)

It is worth considering whether the focus on lead in this initiative can serve as a model for the study and appropriate regulation of other similar toxins, and specifically the broader toxic chemical spectrum commonly referred to as "persistent bioaccumulative toxins" (PBTs). The EPA has defined this term as "chemicals that are toxic, persist in the environment and bioaccumulate in food chains and, thus, pose risks to human health and ecosystems. The biggest concerns about PBTs are that they transfer rather easily among air, water, and land, and span boundaries of programs, geography, and generations."[237] Other listed PBTs include mercury, PCBs and DDT.[238]

The EPA released a detailed report in 1998 that highlights the agency's concerns with PBTs and the goal of identifying and reducing the current and future risks that PBTs pose to human health and the environment.[239] The thrust of this multimedia strategy centers around creating "National Action Plans" for what the EPA calls "priority PBT pollutants."[240] To date, the EPA has finalized an Alkyl-Lead National Action Plan and is in the process of finalizing or drafting five additional action plans that are listed on the PBT priority list.[241]

The State of Washington, through a Gubernatorial Executive Order and a Department of Ecology formal rulemaking procedure, has initiated an identification and elimination program similar to the EPA's PBT-elimination strategy. Washington State's express goal is "to reduce and eliminate the uses and releases of PBTs in Washington."[242] Through the creation of

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[236] *Ibid.*, 22. Percival's article addresses the myths, history behind, and usefulness of the precautionary principle in today's ever-evolving environmental laws. There is no set model of how the precautionary principle should be implemented in a regulatory sense, but what it does do is to argue for caution when humans are exposed to a toxin like lead. This approach is particularly apt where there is no safe dose of lead in the human body.

[237] EPA, *Persistent Bioaccumulative and Toxic (PBT) Chemical Program, About PBTs*, http://www.epa.gov/pbt/pubs/aboutpbt.htm.

[238] EPA, *Persistent Bioaccumulative and Toxic (PBT) Chemical Program, Fact Sheet*, http://www.epa.gov/pbt/pubs/fact.htm.

[239] EPA, *Multimedia Strategy for Priority Persistent, Bioaccumulative, and Toxic Pollutants*, 63 Fed. Reg. 63926 (Nov. 17, 1998), http://lists.essential.org/1998/dioxin-l/msg00951.html.

[240] *Ibid.*

[241] EPA, *Persistent Bioaccumulative and Toxic (PBT) Chemical Program, PBT Action Plans*, http://www.epa.gov/pbt/pubs/epaaction.htm.

[242] WAC § 173-333-100, *Persistent Bioaccumulative Toxins* (2006), http://www.ecy.wa.gov/laws-rules/wac173333/p0407_cont_a.pdf.

"Chemical Action Plans"[243] or CAPs, the state will attempt to identify, gather information on, and manage the risks posed by PBTs. While this broader PBT regulatory approach has not been widely used in the United States, it reflects appropriate public concern over these toxins, their interaction in the environment, and the risk they pose to human health and the integrity of ecological systems.

Recommendations

- The Vermont Legislature should investigate and consider a broader approach to reduce and eliminate, wherever possible, the release of and exposure to persistent bioaccumulative toxins in Vermont.
- Because federal and state regulations requiring the reduction of persistent bioaccumulative toxins are sparse, the State of Vermont should take a proactive/ precautionary approach to reduce PBT exposure in the state.

[243] *Ibid.* A "Chemical Action Plan" is defined by the rule as "a plan that identifies, characterizes and evaluates uses and releases of a specific PBT or a group of PBTs and recommends actions to protect human health or the environment."