

1 DRAFT LETTER to EPA Administrator on Lead

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3 Lisa P. Jackson, Administrator  
4 United States Environmental Protection Agency  
5 1200 Pennsylvania Ave NW  
6 Washington, DC 20460

7 RE: Childhood Lead Poisoning Prevention

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9 Dear Administrator Jackson:

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11 The Children's Health Protection Advisory Committee (CHPAC) has been asked by the Office  
12 of Children's Health Protection (OCHP) to provide input on upcoming lead regulations being  
13 considered by the Environmental Protection Agency as well as childhood lead poisoning  
14 prevention activities across the agency and in partnership with stakeholders and other agencies.  
15 In the past, EPA has played a leadership role in reducing exposures to lead and CHPAC  
16 encourages EPA to continue. Despite this, childhood lead poisoning remains a persistent public  
17 health problem especially among children living in older, poorly maintained housing, children  
18 under the age of six years and children of color. No "safe" threshold of exposure has ever been  
19 identified, including recent reviews by the U.S. Environmental Protection Agency's (EPA)  
20 Scientific Advisory Board and the Centers for Disease Control and Prevention's Advisory  
21 Committee on Childhood Lead Poisoning Prevention. This demonstrates the need for EPA to  
22 examine its current and pending policies and programs aimed at preventing childhood lead  
23 exposure and to take action.

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25 CHPAC is concerned that both Congress and this Administration have recently abandoned the  
26 battle to protect children from lead poisoning.<sup>1</sup> While we recognize that some of this may be  
27 beyond the control of an EPA Administrator, the 1992 Residential Lead Hazard Reduction Act  
28 (Title X) provided EPA with statutory authority under the Toxic Substances Control Act to  
29 address certain key lead exposure sources related to housing.<sup>2</sup> EPA also has statutory authority to  
30 address lead in air, drinking water, hazardous waste and other media. Housing with deteriorated  
31 lead-based paint, contaminated housedust and contaminated bare residential soil account for 70%  
32 of the nation's lead poisoning cases.<sup>3</sup> Title X and related statutes mandate that the nation's lead  
33 poisoning prevention efforts involve a three-legged stool to address the problem:

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- 35 • EPA sets standards for exposure, training for inspectors and abatement contractors,  
36 environmental laboratory quality control, and disclosure (with HUD);
- 37 • CDC develops guidance for clinicians, supports staffing and surveillance at local lead  
38 poisoning prevention programs, conducts population-based prevalence studies to find  
39 children at greatest risk, ensures blood lead laboratory quality control, and conducts  
40 intervention in certain international disasters, such as the hundreds of children who died  
41 from lead poisoning in Nigeria;
- 42 • HUD supports local lead hazard control programs and enforces lead requirements in  
43 federally assisted housing programs.

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45 Without all three legs, the nation cannot succeed in addressing childhood lead poisoning.

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47 The CDC program for 2012 has been largely eliminated and EPA and HUD programs have  
48 inadequate (and increasingly fewer) resources. As a leader in children's health protection, this  
49 requires your immediate and urgent attention.

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51 There are nearly half a million children who have blood lead levels above 5  $\mu\text{g}/\text{dL}$ ,<sup>4</sup> which has  
52 recently been recommended by the CDC Advisory Committee on Childhood Lead Poisoning  
53 Prevention as the reference value.<sup>5</sup> Over 30 million houses still have lead-based paint.<sup>6</sup> The  
54 National Toxicology Program recently drafted a major review showing the harm that lead does to  
55 children, pregnant women and breast feeding mothers is even worse than we thought previously,  
56 with sufficient evidence now available to conclude that at levels of exposure  $< 5 \mu\text{g}/\text{dL}$ , a  
57 relationship clearly exists linking lead with decreased academic achievement and specific  
58 cognitive measures, increased incidence of ADHD and problem behaviors.<sup>7</sup>

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60 How can education be a priority for the nation if at the same time we ignore the impact of lead  
61 exposure on academic achievement? It costs \$38,000 to provide special education to a child with  
62 lead poisoning.<sup>8</sup> Many studies have shown that lead poisoning prevention saves billions of  
63 dollars.<sup>9</sup> More than that, it avoids needless pain and suffering.

64  
65 Thousands of imported consumer products contaminated with lead continue to pose major threats  
66 to our children.<sup>10</sup> The average blood lead level in the U.S. is still over a hundred times above  
67 background levels.<sup>11</sup>

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69 The retreat from childhood lead poisoning prevention will especially affect children of color and  
70 from low-income families where the risks are greatest and will not save money. Increasing the  
71 disparities and environmental injustices will only serve to add to the burden of these families.  
72 The Executive Order regarding Environmental Justice has recently been updated.<sup>12</sup>

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74 EPA's recent lead poisoning prevention efforts have been wanting, mainly due to inadequate  
75 resources. The Agency has taken only one or two enforcement actions to implement its  
76 Renovation, Repair and Painting Rule in the three years after it was promulgated. The Agency  
77 rejected a proposed rule to require dust lead testing following renovation to ensure cleanup is  
78 done properly and that children are protected,<sup>13</sup> as is already required in federally-assisted  
79 housing and many local rules.<sup>14</sup> EPA has not updated its dust lead standard, despite reports from  
80 its Science Advisory Board<sup>15</sup> and well-documented evidence that the existing standards  
81 promulgated more than a decade ago do not protect children adequately.<sup>16</sup> A recently published  
82 study also shows that even in high risk houses treated 12 years ago in the U.S. Department of  
83 Housing and Urban Development (HUD) lead hazard control grant program, dust lead levels of  
84  $10 \mu\text{g}/\text{ft}^2$  on floors and  $100 \mu\text{g}/\text{ft}^2$  on window sills can be readily obtained and are feasible. These  
85 levels are far lower than the current EPA dust lead standards, which are  $40 \mu\text{g}/\text{ft}^2$  for floors and  
86  $250 \mu\text{g}/\text{ft}^2$  for window sills.<sup>17</sup>

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88 The EPA Administrator co-chairs the President's Task Force on Environmental Health and  
89 Safety Risks to Children with the Secretary of Health and Human Services (HHS). Previously,  
90 this Task Force issued the first federal interagency strategy to eliminate childhood lead

91 poisoning.<sup>18</sup> The country did not meet the goals set. We urge the Administrator to meet with the  
92 HHS Secretary and convene a cabinet-level Task Force meeting to determine how the federal  
93 government's lead poisoning prevention activities can be restored to meet existing and new  
94 sources of lead exposure endangering our children. Specifically, such a meeting should  
95 determine how the nation can avoid ending lead poisoning prevention programs at hundreds of  
96 local health departments due to loss of CDC funding beginning this August.

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98 In July 2011, CHPAC was briefed on several current lead regulations under development at EPA  
99 and subsequently considered a set of OCHP charge questions. Based on these considerations,  
100 EPA should take actions on its own and/or with appropriate partners to address four overarching  
101 CHPAC recommendations:

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- 103 I. Adopt a unified approach across agency actions regarding target blood lead levels;
- 104 II. Engage other federal agencies and stakeholders on implementing lead poisoning  
105 prevention actions and communication strategies;
- 106 III. Identify emerging sources of lead exposure and children who may be at risk for these  
107 exposure sources; and
- 108 IV. Eliminate production of residential lead-based paint and the production of other sources  
109 of lead exposure in other countries;
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111 **I. CHPAC Recommends that EPA adopt a unified approach across agency actions**  
112 **regarding target blood lead levels.**

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114 **I.a. CHPAC recommends that EPA revise its Integrated Exposure Uptake**  
115 **Biokinetic (IEUBK) model for estimating children's blood lead levels associated**  
116 **with different and multiple exposure pathways.** Historically, EPA has used the  
117 IEUBK model<sup>19</sup> to attempt a unified approach to estimating potential blood lead levels  
118 from environmental and other data. While the IEUBK model has been helpful in the past,  
119 there are important limitations that CHPAC believes can be overcome in part by  
120 simultaneous consideration of epidemiological data, consistent with recommendations  
121 made by EPA's Science Advisory Board (SAB)<sup>20</sup>. An important limitation of the model  
122 is the lack of a dust lead loading metric. Instead, the model only permits input of dust  
123 lead concentration (loading refers to lead mass divided by surface area ( $\mu\text{g}/\text{ft}^2$ ) while  
124 concentration refers to lead mass divided by total sample weight ( $\text{mg}/\text{kg}$ )). Dust lead  
125 exposure has been shown to be one of the most significant sources of exposure to  
126 children and loading is the most appropriate metric for exposure.<sup>21</sup> The lack of the  
127 loading metric in the IEUBK model means that conversion factors needed to be  
128 developed for use in the model, which introduces another potential source of error. The  
129 model also necessitates the use of default terms that may or may not be relevant to a  
130 specific regulatory action. CHPAC agrees with the SAB recommendation that  
131 epidemiological studies should be evaluated as well, because they do not require the use  
132 of conversion factors or default assumptions. This recommendation will enable EPA  
133 policymakers to understand all scientific evidence from both the IEUBK model and  
134 epidemiological data.

136 **I.b. CHPAC recommends that EPA adopt an incremental approach to specifying**  
137 **target blood lead levels.** Ideally, regulations should be crafted to eliminate exposures  
138 entirely and that should be an expressed goal in all EPA regulations. Because it is not  
139 possible to eliminate all exposures, EPA regulatory actions should produce consistent  
140 results by using an incremental rather than a static target blood lead level. The blood lead  
141 metric is both a measure of exposure and a measure of toxicity. Traditionally, EPA has  
142 set an exposure limit for dust that is expected to achieve a static target blood lead level,  
143 such as 1 or 5 or 10 µg/dL. The alternative is to select and use incremental levels in dust,  
144 soil, food, water, air and other relevant media that result in a corresponding incremental  
145 change in blood lead level, such that the incremental change is no greater than 1 or 2.5  
146 µg/dL. CHPAC believes that an incremental approach to exposure assessment is superior,  
147 because it is more likely to be able to account for measured and estimated contributions  
148 to exposures from all exposure pathways. However, programs across EPA must also  
149 agree on the overall limit for an incremental change in blood level (this will be based on  
150 the corresponding decrement in a health or cognitive measure such as IQ). This  
151 recommendation is consistent with EPA's Science Advisory Board<sup>22</sup> and its Clean Air  
152 Science Advisory Committee.<sup>23</sup>

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154 **I.c. CHPAC recommends that EPA collect data from its Environmental Lead**  
155 **Laboratory Proficiency Testing Program and assess feasibility for reliably**  
156 **measuring low environmental lead levels and also analyze housing data to assess the**  
157 **feasibility of meeting lower residential dust lead exposure limits.** An important  
158 consideration for lead poisoning prevention regulations is whether a given exposure limit  
159 can be reliably measured and is achievable and is sustainable, because there is little  
160 benefit to setting a regulatory standard that no one can meet or cannot be measured.  
161 CHPAC recommends that EPA assess the ability of laboratories to detect levels of lead in  
162 environmental samples as an essential component of its Environmental Lead Laboratory  
163 Proficiency Testing Program (ELLPAT). This program provides standardized approaches  
164 for assessing proficiency (e.g., blind testing of samples with known quantities of lead)  
165 and assesses specific laboratory performance. CHPAC recommends that EPA collect data  
166 on laboratory detection and reporting limits as part of its ELLPAT program to inform its  
167 regulatory efforts as they apply to feasibility. With regard to cost-effectiveness, CHPAC  
168 recommends that EPA consider the health impact of regulatory decisions and the costs  
169 associated with decrements to health, not just the cost associated with compliance. EPA  
170 should also analyze new data from long-term follow-up studies of the HUD Lead Hazard  
171 Control Grant Program to determine the feasibility of meeting lower exposure limits for  
172 lead dust. EPA should revise the RRP rule to include clearance testing, which at this time  
173 is the only validated method that has been correlated with children's blood lead levels,<sup>24</sup>  
174 and it is the only method that has an quality control system in place (ELLPAT).  
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176 **I.d. CHPAC recommends developing new, evidence-based health protective lead**  
177 **dust standards.** Perform research and/or analyze existing data to determine what dust  
178 loading standards are, in fact, health protective. Develop laboratory methodologies to  
179 permit routine, precise and accurate dust loading measurements in the necessary range.  
180 Incorporate the new standards into ongoing lead management education programs.

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**I.e. CHPAC recommends that EPA review hazard control studies across agency actions, including revisions to the Lead and Copper Rule.**

Durability of exposure controls should be examined by the agency as it considers revisions to its Lead and Copper Rule for drinking water. Specifically, the agency should examine the long-term effectiveness of managing hazards from lead service lines through drinking water chemistry interventions intended to reduce lead content in drinking water. CHPAC also recommends that any revised regulation for drinking water end the practice of partial lead pipe replacements, which has been shown to at least temporarily increase lead in drinking water.<sup>25</sup> Any new regulation should provide the legal foundation to permit leaded drinking water lines to be replaced completely, not only up to the property line.

**II. CHPAC Recommends that EPA engage other federal agencies and stakeholders on implementing lead poisoning prevention actions and communication strategies.**

**II.a. CHPAC recommends that the EPA Administrator and the Secretary of Health and Human Services convene a cabinet-level meeting of the Interagency Task Force on Children’s Environmental Health and Safety Risks to develop and coordinate strategies to advance childhood lead poisoning prevention through enforcement, training and education of public health and health care professionals, communication strategies, and engagement of other stakeholders.** CHPAC believes that one of the biggest areas of untapped opportunity in lead poisoning prevention involves concerted and coordinated enforcement of existing laws with the Department of Justice, State Attorneys General, local prosecutors and local health, environmental and housing advocates. EPA should partner with the Health Resource Service Administration (HRSA) and CDC, Health Maintenance Organizations (HMOs) and health insurance companies to ensure that funds available for prevention, such as those in the Affordable Care Act are used in a way that incorporates lead hazard control activities. There are also important steps that other agencies, such as CDC, the Food and Drug Administration (FDA) and the Consumer Product Safety Commission (CPSC), can take to protect children and families from contaminated consumer products,<sup>26</sup> especially those imported from other countries. For example, FDA and other agencies should take action to prevent contaminated food, herbal remedies, and pottery from entering the country and prevent lead shot fragments in the food chain. CPSC should ensure that products recalled due to lead contamination are not allowed to be sent to other countries where they could poison children. EPA should work with the Occupational Safety and Health Administration (OSHA) to ensure workers do not take home lead and to conduct workforce training. CDC should continue to provide increased technical assistance to countries battling epidemics of childhood lead poisoning, such as the recent catastrophe in Nigeria that resulted in hundreds of children’s deaths from lead poisoning.<sup>27</sup>

**II.b. CHPAC recommends that EPA engage health and other professionals** who can play an important role in providing information for families and communities regarding other sources of lead exposure such as take-home lead from the workplace (renovation

226 sites, battery manufacturers, etc.), hobbies, sporting equipment (making lead weights for  
227 fishing lines at home), and reloading of ammunition used for hunting. CHPAC  
228 recommends that EPA work with other federal agencies, such as HHS and the Maternal  
229 and Child Health Bureau and HUD, to standardize training of non-traditional workers  
230 and utilize them to implement evidence-based lead exposure reduction strategies and  
231 educate residents at the community level. CHPAC recommends that EPA provide  
232 guidance for training of residents and practicing physicians as well as other healthcare  
233 providers about the harmful effects of lead exposure and avoidance practices. EPA  
234 should partner with American Academy of Pediatrics, American Academy of Family  
235 Practitioners, American College of Obstetricians and Gynecologist and CDC to create a  
236 module for maintenance of certification on lead exposure, lead monitoring and avoidance  
237 practices. EPA should partner with CDC to create a training module for physicians and  
238 nurse practitioners that can be integrated into the medical school/nurse practitioner  
239 curriculum.

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241 **III. CHPAC recommends that EPA identify emerging sources of lead exposure to**  
242 **children and women who are or may become pregnant or who are breastfeeding.**  
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244 Further research is needed to identify emerging sources of lead exposure, such as those in  
245 consumer products. The nation still has no good assessment of exposures related to  
246 consumer products containing lead, like toys, jewelry, cosmetics, pottery, and batteries,  
247 especially those from other countries. For example, it is not known whether new lead-  
248 based residential paint now being manufactured in China, India, Nigeria and other  
249 countries is being imported into the U.S. Research is needed to determine if lead  
250 stabilizers used in plastics and other products is being released. Fate and transport studies  
251 are needed to determine sources of lead production and use in commercial products.  
252 Further research is needed to estimate exposures from commercial buildings. Sampling  
253 protocols to reliably measure lead in water in different building configurations is needed,  
254 and policy research is needed to determine the best way to stop partial replacement of  
255 lead drinking water lines. Specifically, the current practice is for public utilities to replace  
256 only the portion of the lead drinking water line on public property, with the owner  
257 expected to pay for the pipe replacement on the private property, which often cannot  
258 occur because owners do not have adequate resources.

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260 **IV. CHPAC recommends that EPA work to eliminate production of residential lead-based**  
261 **paint and the production of other sources of lead exposure in other countries.**  
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263 EPA should provide financial and technical support for the Global Alliance to Eliminate  
264 Lead in Paints, currently being developed by the World Health Organization (WHO).<sup>28</sup>  
265 The Agency should also support voluntary compliance programs for lead production  
266 activities in developing nations, such as BEST (Better Environmental Sustainability  
267 Targets).<sup>29</sup> EPA should work with the State Department, WHO and the United Nations  
268 Environment program to help prevent lead exposures to refugees and others, and to  
269 promote international trade agreements and other instruments to eliminate the

270 unnecessary use of lead in consumer and other products, as recommended by the  
271 American Public Health Association.<sup>30</sup>

272  
273 CHPAC urges you to consider these recommendations to ensure that lead poisoning prevention  
274 is not relegated to the status of a “pyrrhic” hollow victory.<sup>31</sup> The battle has not yet been won and  
275 the problem remains large. CHPAC urges you to take action to ensure that the battle against lead  
276 poisoning becomes a true victory.

277  
278 Respectfully,

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<sup>1</sup> The President’s budget for 2012 proposed to cut in half the lead poisoning prevention program at CDC. Congress in the final budget appropriation reduced the CDC lead poisoning prevention program from \$30 million to only \$2 million. As a result, health departments’ lead programs across the country will be forced to shut down as early as the summer of 2012, severely limiting the nation’s ability to properly identify children who are at risk and take action before harm is done.

<sup>2</sup> Public Law 102-550

<sup>3</sup> Levin R, Brown MJ, Kashtock ME, Jacobs DE, Whelan EA, Rodman J, Schock MR, Padilla A, Sinks T. Lead Exposure in US Children, 2008: Implications for Prevention. *Environ Health Perspect.* 116:1285-1293(2008).

<sup>4</sup> In 2005-06, data from the National Health and Nutrition Examination Survey showed that an estimated 590,100 children 1-5 had blood lead levels  $\geq 5 \mu\text{g/dL}$ ; in 2007-08 that number increased to 646,400; in 2009-10 the number declined slightly to 442,000. Data from: National Performance Measures of Blood Lead in Children. Will Wheeler Presentation to the Advisory Committee on Childhood Lead Poisoning Prevention Nov 14, 2011

<sup>5</sup> [http://www.cdc.gov/nceh/lead/ACCLPP/Final\\_Document\\_030712.pdf](http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf)

<sup>6</sup> Jacobs DE, Clickner RL, Zhou JL, Viet SM, Marker DA, Rogers JW, Zeldin DC, Broene P and W. Friedman. The Prevalence of Lead-Based Paint Hazards in U.S. Housing, *Environ Health Perspect* 110:A599-A606, Sept 13, 2002.

<sup>7</sup> National Toxicology Program. Draft ntp monograph on health effects of low-level lead. October 14, 2011, National Institute Of Environmental Health Sciences, National Institutes Of Health, U.S. Department Of Health And Human Services

<sup>8</sup> Korfmacher et al.

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<sup>9</sup> Gould E. Childhood lead poisoning: Conservative estimates of social and economic costs of lead hazard control. *Environ Health Perspect* 117:1162-1167 (2009)

<sup>10</sup> Toys and other consumer products recalled. See <http://www.cdc.gov/nceh/lead/Recalls/allhazards.htm>

<sup>11</sup> Smith, D.R., Flegal, A.R., 1992. The public health implications of humans' natural levels of lead. *Am. J. Public Health* 82(11), 1565-1566.

<sup>12</sup> Memorandum Of Understanding on Environmental Justice and Executive Order 12898; [http://www.doi.gov/oepc/EJ\\_MOU.pdf](http://www.doi.gov/oepc/EJ_MOU.pdf). HHS 2012 Environmental Justice Implementation Progress Report 02/12 [http://www.hhs.gov/environmentaljustice/progress\\_2012.pdf](http://www.hhs.gov/environmentaljustice/progress_2012.pdf)

<sup>13</sup> Lead; Clearance and Clearance Testing Requirements for the Renovation, Repair, and Painting Program, Environmental Protection Agency, Final rule. 47918 Federal Register Vol. 76, No. 151 Friday, August 5, 2011

<sup>13</sup> 24 CFR Part 35

<sup>14</sup> 24 CFR Part 35

<sup>15</sup> [http://yosemite.epa.gov/sab/sabproduct.nsf/CD05EA314294B683852578C60060FB08/\\$File/EPA-SAB-11-008-unsigned-revised.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/CD05EA314294B683852578C60060FB08/$File/EPA-SAB-11-008-unsigned-revised.pdf)

<sup>16</sup> See, for example: Gaitens JM, Dixon SL, Jacobs DE, Nagaraja J, Strauss W, Wilson JW, Ashley PJ. U.S. Children's Exposure to Residential Dust Lead, 1999-2004: I. Housing and Demographic Factors Associated with Lead-contaminated Dust, *Env Health Perspect* 117: 461-467 (2009) AND Dixon SL, Gaitens JM, Jacobs DE, Strauss W, Nagaraja J, Pivetz T, Wilson JW, Ashley PJ. U.S. Children's Exposure to Residential Dust Lead, 1999-2004: II. The Contribution of Lead-contaminated Dust to Children's Blood Lead Levels, *Env Health Perspect* 117: 468-474 (2009) and Dixon SL, Jacobs DE, Wilson JW, Akoto JY, Nevin R, Clark CS. 2012. Window replacement and residential lead paint hazard control 12 years later. *Env Res*. Accepted Jan 23, 2012.

<sup>17</sup> Dixon SL, Jacobs DE, Wilson JW, Akoto JY, Nevin R, Clark CS. 2012. Window replacement and residential lead paint hazard control 12 years later. *Env Res*. Accepted Jan 23, 2012.

<sup>18</sup> Eliminating Childhood Lead Poisoning: A Federal Strategy, President's Task Force on Children's Environmental Health Risks and Safety Risks, principal author, Washington DC (March 2000).

<sup>19</sup> See <http://www.epa.gov/superfund/lead/products.htm>

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[http://yosemite.epa.gov/sab/sabproduct.nsf/RSSRecentHappeningsBOARD/CD05EA314294B683852578C60060FB08/\\$File/EPA-SAB-11-008-unsigned-revised.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/RSSRecentHappeningsBOARD/CD05EA314294B683852578C60060FB08/$File/EPA-SAB-11-008-unsigned-revised.pdf)

<sup>21</sup> Lanphear BP, Matte TD, Rogers J, Clickner RP, Dietz B, Bornschein RL, Succop P, Mahaffey KR, Dixon S, Galke W, Rabinowitz, Farfel M, Rohde C, Schwartz J, Ashley PJ, Jacobs DE. The Contribution of Lead-Contaminated House Dust and Residential Soil to Children's Blood Lead Levels: A Pooled Analysis of 12 Epidemiologic Studies, *Env. Research*, 79:51-68, 1998.



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<http://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/546fdc6ecc836f158525795f0049242f.OpenDocument>

<sup>24</sup> Lanphear BP, Emond E, Weitzman M, Jacobs DE, Tanner M, Winter N, Yakir B, Eberly S. A Side-By-Side Comparison of Dust Collection Methods for Sampling Lead-Contaminated House Dust, *Environ Res* 68, 114-123, 1995.

<sup>25</sup> Mary Jean Brown, Jaime Raymond, David Homa, Chinaro Kennedy, Thomas Sinks. 2011. Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998–2006. *Environmental Research* 111 (2011) 67–74

<sup>26</sup> Toys and other consumer products recalled. See <http://www.cdc.gov/nceh/lead/Recalls/allhazards.htm>

<sup>27</sup> [Dooyema CA](#), [Neri A](#), [Lo YC](#), [Durant J](#), [Dargan PI](#), [Swarthout T](#), [Biya O](#), [Gidado SO](#), [Haladu S](#), [Sani-Gwarzo N](#), [Nguku PM](#), [Akpan H](#), [Idris S](#), [Bashir AM](#), [Brown MJ](#). Outbreak of Fatal Childhood Lead Poisoning Related to Artisanal Gold Mining in Northwestern Nigeria, 2010. *Environ Health Perspect*. 2011 Dec 20. [Epub ahead of print]

<sup>28</sup> see [http://www.who.int/ipcs/features/pb\\_alliance/en/index.html](http://www.who.int/ipcs/features/pb_alliance/en/index.html)

<sup>29</sup> see <http://www.okinternational.org/lead-batteries/BEST-Standard>

<sup>30</sup> see <http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1348>

<sup>31</sup> Lanphear BP 2007. The Conquest of Lead Poisoning: A Pyrrhic Victory. *Environ Health Perspect* 115:A484-A485.

<http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.10871>

