

A CALL FOR CONGRESSIONAL ACTION

# TOXIC Toys US

## PVC Toxic Chemicals in Toys and Packaging



A Report to the  
National Commission of  
Inquiry into Toxic Toys

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National Commission of Inquiry into Toxic Toys**

**November 2010**

**Center for Health, Environment & Justice (CHEJ)  
Teamsters Office of Consumer Affairs**

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## Acknowledgements

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### About The Center for Health, Environment & Justice

CHEJ mentors a movement building healthier communities by empowering people to prevent harm through programs focusing on different types of environmental health threats. CHEJ works with communities to empower groups by providing the tools, direction, and encouragement they need to advocate for human health, to prevent harm and to work toward environmental integrity. Following her successful effort to prevent further harm for families living in contaminated Love Canal, Lois Gibbs founded CHEJ to continue the journey. CHEJ has assisted more than 10,000 groups nationwide.

### About the International Brotherhood of Teamsters

More than 1.4 million Teamsters work in industries from ports to airlines, from roads to rail, from food processing and distribution to waste and recycling. The Teamsters fight for

environmental and social justice across the global supply chain. There can be no sustainability without respect for workers and communities.

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## **Statement of the *National Commission of Inquiry into Toxic Toys***

November 18, 2010

*This report is sponsored by the Center for Health, Environment & Justice (CHEJ) and the Teamsters Office of Consumer Affairs. We solicited environmental health experts, as part of a Commission of Inquiry into Toxic Toys, for their review and opinion and on our report findings. Their statement follows.*

In 2008, Toys “R” Us pledged to reduce the use of PVC plastic in toys and to offer more PVC-free toys. The attached study, undertaken by the Center for Health, Environment & Justice and the Teamsters Office of Consumer Affairs, with the laboratory assistance of the Ecology Center of Ann Arbor, MI, reveals that the majority of toys in a limited sample from two Toys “R” Us outlets still contain PVC. In addition, 59 of the 60 toys sampled did not display labeling indicating that they contained PVC.

The manufacture and disposal of polyvinyl chloride (PVC) plastic involves the exposure of workers and the general public to numerous hazardous chemicals.

Moreover, in order for PVC to be used in toys, it must be mixed with lead, cadmium or organic chemicals containing tin. These chemicals are all toxic to children when ingested. In particular, they are all linked with potential brain damage. Because these chemicals are not tightly bound to the plastic, the lead or the cadmium or the organic chemicals containing tin can enter children’s bodies from toys when the children chew or suck on the toys or the PVC-containing packaging that the toys come in.

It is widely known from studies undertaken by government agencies and independent researchers that chemicals used in the manufacture of PVC and which result from the disposal of PVC end up in the bodies of infants, children and adults. These chemicals were never intended to be in the bodies of infants, children or adults and may be linked to a number of adverse outcomes including learning disabilities, behavior problems, certain cancers, and to reproductive and development defects.

The Center for Health, Environment & Justice and the Office of Consumer Affairs Office of the International Brotherhood of Teamsters asked this independent Commission of Inquiry into Toxic Toys<sup>1</sup> to review the attached document. Having done so, the Commission strongly supports the recommendations contained in the report, which include:

- The phase out PVC toys and packaging by switching to safer materials;

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<sup>1</sup> The Commission of Inquiry into Toxic Toys reviewed the attached document. It did not have a role in the design of the data collection or analysis.

- Eliminate the stocking of products that contain organotins and other hazardous chemical additives in toys and children's products;
- Label the material content of toys so that consumers can easily identify safer products.

The Commission also endorses the recommendation contained in the report for comprehensive reform of the Toxic Substances Control Act.

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\*Organizations listed for identification purposes only.

## Executive Summary

As the holiday season approaches and parents and others begin considering their holiday purchases of the latest toys and games, it is vital that those who purchase toys and games have the information they need to purchase safe, non-toxic gifts for children. Unfortunately, Toys “R” Us continues to sell toys containing and packaged in polyvinyl chloride (also known as PVC or vinyl), a plastic toxic to our health and the environment.

Children are not "little adults"—their developing brains and bodies, their metabolism and behaviors make them uniquely vulnerable to harm from toxic chemicals such as those released by the PVC lifecycle.

### Toys “R” Us’ Commitment to Reduce PVC and Offer More PVC-Free Products

**In 2008, following waves of toy recalls and growing consumer demand for safer, PVC-free children’s products, Toys “R” Us pledged to phase out the sale of toys containing lead or phthalates, reduce the sale of PVC-containing products and offer more PVC-free products.** Toys “R” Us is the largest specialty retailer of toys in the United States, and operates under the Toys “R” Us, F.A.O. Schwartz and Babies “R” Us retail brand names. With more than \$13 billion in annual revenues and more than 1,550 stores worldwide, Toys “R” Us has a major influence on the toy market. As one of the largest toy retailers in the world, Toys “R” Us has the power and the responsibility to sell toys that are safe for our health and the environment and free of harmful plastics such as PVC.

Toys “R” Us promise to reduce the sale of PVC-containing products and to offer more PVC-free products is very important for protecting the health of children and the environment.

**To determine whether Toys “R” Us has lived up to its commitment to reduce the sale of PVC-containing toys and offer more PVC-free products, we conducted a two-phased investigation to test toys, children and infant products sold at Toys “R” Us and Babies “R” Us for the presence of chlorine, tin, lead and cadmium.** We conducted two rounds of testing. The first round of testing focused only on toys related to the popular feature-length motion picture “Toy Story 3” and was limited to collecting nine (9) different toys or samples. The second round of testing was in the fall of 2010 and involved a broad collection of 60 randomly selected samples from Toys “R” Us and Babies “R” Us. The toys we tested were randomly selected and are representative of the types of toys sold by Toys “R” Us. They include toys marketed for a variety of age groups, different types of products (i.e. balls, dolls, figurines, baby functional items), and were manufactured or marketed by well-known companies and brands (i.e. Disney, Nickelodeon, Marvel, Hasbro, Mattel, etc.).

In this investigation, the presence of high concentrations of chlorine is considered a surrogate for finding PVC as PVC is the only common plastic made with chlorine. Similarly, the presence of tin in the samples is considered a surrogate for the presence of organotins as they are commonly used in PVC products as an additive. Organotins, lead and cadmium, along with other chemicals such as phthalates, have been found in many PVC toys and other children’s products. This investigation does not provide a measure of health risk or chemical exposure associated with any individual product, or any individual element or related chemical.



**Testing was conducted using a portable X-Ray Fluorescence (XRF) analyzer by the Ecology Center** in Ann Arbor, Mich. The XRF is an accurate device that has been used by the Environmental Protection Agency (EPA) to screen packaging; the Food and Drug Administration (FDA) to screen food; and many state and county health departments to screen for residential lead paint. The XRF methodology can identify the presence of chemicals such as lead, tin, cadmium, chlorine and others in a wide variety of situations. In this study we report on the results of testing for chlorine, tin, lead and cadmium in both the toys and packaging.

### **Toys “R” Us’ Broken Promise: PVC and Organotins Widespread in Toys and Packaging**

**This investigation found that, despite its commitment more than two years ago, Toys “R” Us continues to stock and sell an extensive assortment of toys and infant products that are made of and packaged in PVC.** These toys and packaging were also found to contain organotins. Almost all of these toys were made in China.

Toys that tested positive for PVC include Barbie, “Toys Story 3” Woody and Buzz Lightyear figures, Disney Princess Royal Giggles doll, Zhu Zhu Pets Hamster Hangout, Nickelodeon’s Dora the Explorer and Diego figures, Sesame Street Elmo Faucet Cover, Club Penguin figurines, Imaginext toddler action figures and many others, from dolls and balls, to baby bath time toys and products, and even My Name Sippy Cups. PVC was also found in toys whose brands are owned by Geoffrey LLC, a subsidiary of Toys “R” Us, including You and Me dolls, Especially for Baby, and Sizzlin’ Time items.

### **PVC in Toys/Children’s Products at Toys “R” Us**

- 72.5% of all toys/children’s products tested contained high levels of chlorine, indicating they were likely made of PVC.

### **Chemical Additives in Toys/Children’s Products at Toys “R” Us**

- 20.3% of all toys/children’s products tested contained tin, indicating the likely presence of organotins in these toys.
- 5.8% of all toys/children’s products tested contained low levels of lead, indicating progress by Toys “R” Us and its suppliers in reducing the use of lead in PVC toys.
- 1.4% of all toys/children’s products tested contained low levels of cadmium, indicating progress by Toys “R” Us and its suppliers in reducing the use of cadmium in PVC toys.

### **PVC and Organotins in Toys Intended for Infants and Young Children**

- 67% of fall 2010 toys marketed to infants 3-12 months and up in age contained chlorine, indicating they were likely made of PVC. 17% of these age-targeted group toys contained tin, indicating the likely presence of organotins in these toys.
- 81% of fall 2010 toys marketed to children 18-36 months and up in age contained chlorine, indicating they were likely made of PVC. 19% of these age-targeted group toys contained tin, indicating the likely presence of organotins in these toys.

- 62% of fall 2010 toys marketed to children 4-6 years and up in age contained chlorine, indicating they were likely made of PVC. 46% of these age-targeted group toys contained tin, indicating the likely presence of organotins.

### **PVC in Toy Packaging at Toys “R” Us**

- 52.9% of all toy packaging tested contained high levels of chlorine, indicating they were likely made of PVC.

### **Chemical Additives in Toy Packaging at Toys “R” Us**

- 52.9% of all toy packaging tested contained tin, indicating the likely presence of organotins.
- 5.9% of all toy packaging tested contained low levels of lead, indicating progress by Toys “R” Us and its suppliers in reducing the use of lead in PVC packaging.
- 0% of packaging materials contained detectable levels of cadmium, indicating progress by Toys “R” Us and its suppliers in reducing the use of cadmium in PVC packaging.

### **Toys Made in China**

- 98% of the toys in the fall 2010 testing were made in China.

### **Inadequate Labeling of Toys and Packaging**

- In the fall 2010 testing, only one of the 60 products that we tested was labeled as containing PVC. This label was hidden under cardboard packaging and evident only after purchase.
- None of the products we tested were labeled as containing organotins, lead or cadmium.
- Of the toy packaging that we tested, 91% had no markings or labels that could help a consumer identify the plastic. Only two packages had a PVC marking, but this was on the bottom, hard to see and required extensive inspection.

### **Progress in Removing Lead from Toys and Packaging**

The results of the study indicate that toy manufacturers and retailers like Toys “R” Us have made progress in reducing, though not eliminating, the use of lead in children’s toys. The Consumer Product Safety Improvement Act (CPSIA), passed in 2008, also had a significant impact in reducing the use of lead in the global toy supply chain. We found 5.8% of all the toys and children’s products we tested contained lead and 1.4% of them contained cadmium. Similarly, 5.9% of the packaging we tested contained lead and none of the packaging samples we tested contained cadmium. This is certainly good news for parents concerned about purchasing toys that may pose health risks for their children.

### **The Toxic Shell Game: Hazardous Organotins Replacing Lead and Cadmium**

In order to make toys out of PVC, plasticizers and stabilizers, such as lead, phthalates and organotins, must be added to the PVC formulation. Without these additives, it’s not possible to

use PVC to make toys or to create packaging. Lead has been identified as a problem chemical and it seems that progress has been made in removing lead from toys and packaging sold at Toys “R” Us stores. However, according to the findings of this investigation, it now appears that the company and its suppliers may simply have substituted one toxic additive, lead, for another, organotins. Organotins, which were introduced to replace toxic metal stabilizers like lead and cadmium in PVC manufacturing, are also toxic and have also been found to leach from PVC products. Organotins affect the central nervous system, skin, liver, immune system and reproductive system. The diorganotins, such as dioctyltin, can adversely impact child development and can cause birth defects. Dibutyl tin is toxic to nervous system cells at concentrations similar to those found in people today.

Since the organotins and other additives **are not chemically bound to the PVC in toys, they can migrate from within the toys to the surface. In turn, children may be exposed to these hazardous substances by playing with, chewing on, or sucking on the toys.**

Whether it’s lead or the organotins, the best approach to avoiding the various toxic additives is to avoid toys and products made of PVC.

### **Toys “R” Us: Lack of Transparency Undermines Parents’ Right to Know**

Toys “R” Us prides itself in being “a leader in web search results for toys and baby goods, driving increased traffic to the company’s e-commerce businesses and providing parents and gift givers with a wide assortment of the most sought-after products.” Its toys and merchandise are available from at least one of the online catalogs tied to the company, such as [Toysrus.com](http://Toysrus.com), [Babiesrus.com](http://Babiesrus.com), [eToys.com](http://eToys.com), [babyuniverse.com](http://babyuniverse.com), [FAO.com](http://FAO.com) and [Toys.com](http://Toys.com). While parents can easily use the power of the Internet to find information on price, availability, photos, customer reviews, and key characteristics through Toys “R” Us’ online catalogs, it is nearly impossible to identify which toys are PVC-free or which contain PVC.

Most toys that tested positive for PVC were not labeled as such on the product or packaging, making it nearly impossible for parents to choose PVC-free products for their children. In the fall 2010 testing, only one of the 60 products was labeled as containing PVC. This label was hidden under cardboard packaging and evident only after purchase. None of the products were labeled as containing organotins. We conducted an online analysis to determine whether one can identify PVC and PVC-free products through the Toys “R” Us website. While there are more than 6,000 products accessible online, only 10 were labeled as “PVC-free” and another 26 acknowledged as “PVC-made.” However, our investigation found that 72.5% of the toys/children’s products tested contained chlorine and were likely made of PVC.

### **Toys “R” Us: Disingenuous Marketing on PVC**

Adding insult to injury, the shelves of Babies “R” Us are stocked with infant baby bottles and baby feeding products brightly labeled as BPA and PVC-Free, but often only an aisle down, one can find baby bath time toys and products, several of which tested positive for PVC, though most lack any informative label to guide concerned parents. Toys “R” Us markets to the very same

babies' caregivers both set of products: advertising how it is keeping toxics out of one set of infant products while being silent on the presence of PVC in another set of infant products.

### **PVC's Lifecycle: Toxic Hazards from Production to Use to Disposal**

**PVC (or vinyl) plastic is used to manufacture many consumer products, including children's toys and infant products.** The lifecycle of PVC, from manufacturing to use and disposal, uses and releases hazardous chemicals including chlorine gas, vinyl chloride, ethylene dichloride, dioxins and furans, mercury, lead, phthalates, cadmium and organotins that are toxic to children's health and the environment. Organotins, lead and cadmium are used as stabilizers in PVC to prevent degradation from heat during processing and from exposure to ultraviolet light during the useful life of a product.

**Some of these substances are persistent bioaccumulative toxic (PBT) chemicals that have been documented to be accumulating in human tissue around the world.** As a result of this contamination, babies today are born pre-polluted with potentially harmful levels of dioxins in their body. Chemicals released in PVC's lifecycle have been linked to chronic diseases that are on the rise, including breast cancer, learning and developmental disabilities, and reproductive health problems.

### **Limitations of Investigation**

Our investigation did not test nearly all of the thousands of products sold by Toys "R" Us. However, based on a random sampling of toys purchased and tested, we found a substantial percentage of toys made out of and packaged in PVC. We also found a substantial percentage of toys and packaging containing tin, indicating the presence of organotins. Our investigation did not test for the presence of phthalates, which are hazardous chemical additives common in PVC products.

### **Recommendations for Toys "R" Us**

**Based on our investigation, Toys "R"Us, its controlling investors and its suppliers should take the following actions:**

- Phase out PVC toys and packaging and switch to safer materials;
- Set clear public benchmarks and timeframes for implementing this phase out;
- Publicly report on its progress in phasing out PVC;
- Eliminate the sale of products that contain organotins and other hazardous chemical additives in toys and children's products;
- Label the material content of toys so that consumers can easily identify safer products. Toys without PVC should be labeled "PVC-free." Labeling would allow consumers to readily identify products containing PVC and its additives; and
- Update its online catalog with information about which toys contain PVC and those that are "PVC-free"

## **Testing for Phthalates in Toys**

We recommend the federal government, perhaps the Consumer Product Safety Commission, conduct an investigation into whether Toys “R” Us and other retailers have reduced or eliminated the use of phthalates in children’s toys.

## **The Need for Federal Policy Reform**

PVC and organotins in toys and packaging is one of many examples of the need to reform federal law to protect consumers. As toy manufacturers and retailers have removed lead from PVC toys, they have merely swapped one toxic hazard, lead, for another, organotins. The presence of organotins in toys underscores the need for much broader chemical policy reform. Federal policymakers should reform America’s outdated chemical policies that are failing to protect families from toxic chemicals and materials already on the market. The federal law regulating industrial chemicals, the Toxic Substances Control Act (TSCA), is more than 30 years old, outdated, and simply does not work to protect people and the environment. Of the 62,000 chemicals on the market at the time TSCA passed in 1976, EPA has only required testing on about 200; and it has only regulated five.

Legislation to revamp the 34-year-old TSCA has been introduced in the U.S. Senate and House of Representatives. Sen. Frank Lautenberg (D-NJ) sponsored S. 3209, the Safe Chemicals Act of 2010, and Reps. Bobby Rush (D-IL) and Henry Waxman (D-CA) have introduced H.R. 5820, the Toxic Chemicals Safety Act of 2010. The long-awaited, landmark legislation would overhaul the way the federal government regulates chemicals commonly found in our homes, workplaces and communities.

Under the new legislation, chemical manufacturers would have to provide basic health and safety information for chemicals and also demonstrate a chemical’s safety in order to keep it on the market. The bills specify a standard of safety that explicitly protects pregnant women, children, and other vulnerable populations. The worst of the worst chemicals—those that build up in the food chain—would be targeted for immediate reduction. Product manufacturers and retailers that already work to reduce toxic chemicals would be given new information to help them achieve their goals. EPA would also be given a new mandate to identify communities especially hard-hit by toxic chemicals—“hot spots”—and develop action plans to return them to health.

## **Chapter 1: Children's Health and Toxic Additives in PVC Toys and Packaging**

Polyvinyl chloride (PVC or vinyl) is a plastic common in many consumer products including children's toys and packaging. The use of PVC in toys requires the addition of plasticizers and stabilizers such as organotins. Without these additives, it's not possible to use PVC to make toys or to create packaging. Since the organotins and other additives are not chemically bound to the PVC in toys, they can migrate from within the toys to the surface.<sup>12</sup> In turn, children may be exposed to these hazardous substances by playing with, chewing on, or sucking on the toys. In addition, PVC also poses serious environmental and health threats at all stages of its lifecycle: from manufacturing to use to disposal. The lifecycle of PVC toys and packaging releases toxic chemicals hazardous to children's health and the environment, including chlorine gas, vinyl chloride, ethylene dichloride, dioxin, mercury, organotins, phthalates, lead and cadmium.<sup>3</sup> Also, the manufacture and disposal of PVC toys and packaging contributes to the build up of dioxin in people around the globe.<sup>4,5,6,7</sup> The levels of dioxin in our bodies are at or near the levels known to cause harm.<sup>8</sup>

### **Children More At Risk from Toxic Chemicals**

Children are not "little adults"—their developing brains and bodies, their metabolism and behaviors make them uniquely vulnerable to harm from toxic chemicals such as those released by the PVC lifecycle.

- Exposure begins in the womb through the mother's exposures to toxic chemicals. Infants ingest chemicals through breast milk, formula and contact with their environment.
- Rapid brain development in the fetus, infants and young children make them more susceptible to harm from chemicals that may impair brain function and development.
- For their weight, children eat, drink and breathe more than adults—so pound for pound they take in a greater quantity of toxic contaminants. A small exposure translates into a big dose.
- Children put things in their mouths and spend a lot of time on the floor and ground, so they may ingest chemicals from toys, containers, dirt and dust on a regular basis.<sup>9</sup>

### **Health Problems Suffered by Children On the Rise**

Increasingly, children are being found to be hyperactive, slow to learn and disruptive in school. The number of children in special education programs classified with learning disabilities increased 191% from 1977 to 1994.<sup>10</sup> Asthma is a leading reason for school absenteeism and a leading chronic childhood illness.<sup>11</sup> One in 100 American children has an autism spectrum disorder (ASD).<sup>12</sup> Eight thousand American children are diagnosed each year with cancer<sup>13</sup>, and the incidence of cancer in children jumped 26% between 1975 and 1998.<sup>14</sup> The incidence of testicular cancer in young men has increased by 60% and the incidence of hypospadias (abnormal positioning of the opening of the urethra on the penis) in newborn boys doubled from 1968 to 1993.<sup>15</sup> Obesity is a serious health concern for children and adolescents, making children at risk for health problems during their youth and as adults. The prevalence of obesity has increased dramatically in recent years.<sup>16</sup> Early puberty in girls is also on the rise, which is a risk factor for breast cancer.<sup>17</sup> All of these diseases may have environmental exposures as contributing factors.

Concern about children being exposed unnecessarily to toxic chemicals leaching from toys made of PVC indicates the urgent need for precautionary action to eliminate these exposures in children's toys and in all areas where children learn, play and live.

### **Numerous Toxic Chemicals in PVC Toys and Products**

As stated earlier, PVC in toys, children and infant products and packaging often contain toxic additives such as phthalates, organotins, lead and cadmium to soften or stabilize the plastic.<sup>32</sup> These additives are not chemically bound to the plastic and can migrate out of the product<sup>33, 34</sup> posing unnecessary toxic hazards to children and consumers.

### **Organotins in PVC Toys and Packaging**

Organotins are used to stabilize PVC toys and packaging. They can also be toxic. They affect the central nervous system, skin, liver, immune system and reproductive system.<sup>35</sup> The diorganotins, such as dioctyltin, are potent developmental toxins and potent teratogens.<sup>36,37</sup> Dibutyl tin (DBT) is toxic to nervous system cells at concentrations similar to those found in people.<sup>38</sup>

One recent study found that dibutyl tin can interfere with the natural ability of human and animal cells to control important immune responses and inflammation. Researchers found that DBT is toxic to immune cells at very low concentrations similar to what have been measured in human blood.<sup>39</sup>

Further, the mono- and dibutyl tin compounds used in PVC are often contaminated with tributyl tin (TBT), a potent endocrine-disrupting compound that has caused major damage to marine wildlife populations.<sup>40</sup> TBT affects the nervous system, and has caused reproductive and developmental problems in animal studies.<sup>41,42</sup>

### **PVC and Hazardous Chemicals in Our Babies and Bodies**

In recent years, a growing body of scientific evidence has found that toxic chemicals released by the PVC lifecycle have been found in the bodies of babies, children and adults.

- \* Babies are being born pre-polluted with potentially harmful levels of phthalates and dioxin that may possibly cause lifelong health problems.<sup>18,19</sup>
- \* Organotins have been measured in human blood and household dust.<sup>20,21</sup>
- \* Phthalates have been found in indoor air and dust, and in human urine, blood and breast milk.<sup>22</sup>
- \* An extensive study of 2,500 individuals found metabolites of at least one phthalate in 97 percent of those tested.<sup>23</sup>
- \* Phthalate levels are highest in children ages 6 to 11, and in women.<sup>24</sup> In a more recent study, certain phthalates were found to be present in 100% of girls ages 6 to 9.<sup>25</sup>
- \* Dioxin builds up in our bodies over our lifetime and can remain there for many years. The levels of dioxin in our bodies are at or near the levels known to cause harm.<sup>26</sup>
- \* The half-life of dioxin (the amount of time it takes for half of a given amount of dioxin to break down) in people ranges from seven to 11 years.<sup>27</sup>
- \* Infants can be exposed to both phthalates and dioxin in breast milk.<sup>28,29</sup> However, despite these exposures, breast milk is still best for babies.<sup>30,31</sup>

## **Organotins and Obesity**

New research has also found that some organotins have been linked to obesity. TBT has been named an “environmental obesogen” because it can effectively and reproducibly produce obesity in rat pups when given during pregnancy.<sup>43,44,45</sup> Obesity is a serious health concern for children and adolescents, making children at risk for health problems during their youth and as adults. The prevalence of obesity has increased dramatically in recent years.<sup>46</sup> While exposure to toxic chemicals is not the primary cause of obesity, one recent scientific study suggests that certain chemicals may contribute to obesity.<sup>47</sup> PVC chemicals that have been linked to obesity include hormone-disrupting phthalates and organotins.<sup>48,49</sup> One study examining organotins found that “developmental or chronic lifetime exposure to organotins may therefore act as a chemical stressor for obesity and related disorders.”<sup>50</sup>

## **Phthalates in PVC Toys and Products**

We did not test for the presence of phthalates in this investigation, however phthalates are widespread in many PVC products. More than 470 million pounds of phthalates are produced every year.<sup>51</sup> Phthalates are primarily used to soften or plasticize PVC products.<sup>52</sup> In the U.S., approximately 97% of the phthalate DEHP is used to plasticize PVC products.<sup>53</sup> Approximately 95% of the phthalate DINP is used in PVC products such as toys.<sup>54</sup> Phthalates have been linked to reproductive problems including shorter pregnancy duration,<sup>55</sup> premature breast development in girls,<sup>56</sup> sperm damage<sup>57</sup> and impaired reproductive development in males.<sup>58</sup> A number of studies found correlations between phthalates in PVC building materials and asthma in children and adults.<sup>59,60,61,62,63</sup> In 2006, the U.S. National Toxicology Program Expert Panel found that the phthalate DEHP poses a risk to human development and fertility.<sup>64</sup> In 2009, the U.S. Environmental Protection Agency (EPA) announced a chemicals “action plan” for eight phthalates which will likely lead to further regulations of phthalates. EPA plans to initiate rulemaking in autumn 2010 to add them to the Concern List under TSCA section 5(b)(4) as “chemicals that present or may present an unreasonable risk of injury to health or the environment.” They announced this “because of their toxicity and the evidence of pervasive human and environmental exposure to them.”<sup>65</sup> Certain phthalates including DEHP were banned in children’s toys in the United States effective February 2009.<sup>66</sup>

## **Lead and Cadmium in PVC Toys**

Lead has been found in many different PVC products, including toys.<sup>67</sup> In the 1990s, an investigation of vinyl mini-blinds containing lead found they could contaminate house dust and contribute significantly to lead toxicity in children.<sup>68</sup> According to the EPA, “if not detected early, children with high levels of lead in their bodies can suffer from: damage to the brain and nervous system; behavior and learning problems, such as hyperactivity; slowed growth; hearing problems; and headaches.”<sup>69</sup> The National Toxicology Program (NTP) of the Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen.<sup>70</sup>



Cadmium has been found in numerous PVC products including toys.<sup>71</sup> The NTP has determined that cadmium and cadmium compounds are known human carcinogens.<sup>72</sup> The International Agency for Research on Cancer (IARC) classifies cadmium as a known human carcinogen and the EPA classifies cadmium as a probable human carcinogen.<sup>73</sup>

### **Toxic Additives in PVC Packaging**

PVC packaging often contains toxic additives such as phthalates, lead and cadmium. A recent study funded by the EPA conducted by the Toxics in Packaging Clearinghouse found more than 50% of PVC packaging tested contained elevated levels of metals, violating packaging laws in 19 states across the country.<sup>74</sup> The researchers found that all packaging samples containing elevated levels of cadmium were flexible PVC.

## **Chapter 2: The Global Toy Supply Chain and Toys “R” Us’ Commitment to Reduce PVC**

### **The Global Toy Supply Chain**

Worldwide toy sales reached \$80 billion in 2009.<sup>75</sup> While the U.S. and Europe only represent 9% of the total child population, in 2009 57% of the world’s toy purchases were made in the U.S. and Europe.<sup>76</sup> The global toy market is highly concentrated and lopsided, with the U.S. being the biggest retail market, with roughly one fourth of global toy sales occurring stateside, and China being the largest producer and exporter of toys in the world, with more than 2/3 of global toys made in China.<sup>77</sup>

The global toy supply chain is unfortunately often a toxic supply chain. In 2007, more than 17 million toys and children’s products were recalled in the U.S. alone because they contained elevated levels of lead. Many of these recalled toys were made in China.<sup>78</sup> In 2010, more than 12 million items were recalled, from toy jewelry to kids glasses, because of excessive levels of cadmium, another metal with hazardous properties.<sup>79,80</sup>

### **Toys “R” US Has the Market Power to Phase Out Toxic Plastics and Chemicals in Toys**

While China looms like a giant in toy manufacturing, export, and in the headlines on product recalls, real power over the global toy supply chain rests elsewhere. U.S. brands, and especially giant toy retailers such as Toys “R” Us, have the power and the responsibility to phase toxic plastics like PVC out of the toy supply chain.<sup>81</sup> They can define specifications, have the power to give or deny access to store shelves, and have the responsibility to monitor quality.

Toys “R” Us is the leading global specialty retailer of toys and juvenile products when measured by net sales and is the largest specialty retailer of toys in the United States.<sup>82,83</sup> With more than \$13 billion in annual revenues and more than 1,550 stores in the U.S. and worldwide, Toys “R” Us has a major influence on the toy market.<sup>84</sup> The company has approximately 585 Toys “R” Us and 260 Babies “R” Us stores in the U.S. In the U.S. it has absorbed F.A.O. Schwartz and KB Toys, remaining the only specialized toy retailer of relevance with instant name recognition and a strong online platform.<sup>85,86</sup> In 2009, approximately 70% of households with kids under 12 shopped at Toys “R” Us stores, and 84% of first-time mothers shopped at Babies “R” Us stores.<sup>87</sup> Toys “R” Us is involved directly in the sourcing process through Geoffrey LLC, a subsidiary of Toys “R” Us that owns a number of toy brands sold through the retail giant’s stores such as You and Me dolls, Especially for Baby, and Sizzlin’ Time.<sup>88</sup>

Toys “R” Us has widespread global reach well beyond the American marketplace, selling merchandise in 33 other countries and jurisdictions.<sup>89</sup> Its global presence across various regional toy markets further magnifies its influence in standard setting across the entire toy supply chain.

Toys “R” Us therefore can affect the direction and standards of an entire industry. As one of the largest toy retailers in the world, Toys “R” Us has a responsibility to not only sell toys that are safe for our health and the environment and free of toxic materials such as PVC, but also to inform parents of the presence of PVC in all Toys “R” Us products.

## **The 2007 Toy Recalls and CPSIA Law**

In 2007, Toys “R” Us’ CEO Jerry Storch testified before Congress as a flurry of toxic toy recalls showed the whole world the inaction of regulators, the limits of our laws, and the failure of manufacturers or retailers in keeping toxic chemicals out of the global toy supply chain.<sup>90</sup>

At the time, there were a number of major toy recalls due to lead hazards and other risks. Several major toy companies, including Mattel and Toys “R” Us, were brought before a congressional committee to answer questions about loose Chinese standards and spotty U.S. enforcement that contributed to the recalls.<sup>91</sup>

Storch testified that he supported new legislation that would strengthen third-party testing for toys and make the U.S. Consumer Product Safety Commission (CPSC) more "effective" in preventing unsafe products from reaching store shelves. Storch also announced a new web site would contain information about the company's safety standards and improved procedures in publicizing recall information.<sup>92</sup>

The 2007 mass toy recalls and the ensuing consumer backlash brought to national attention the issue of toxic chemicals in toys and generated a flurry of state-level and congressional action, resulting in the 2008 U.S. Consumer Product Safety Improvement Act (CPSIA).<sup>96</sup> The law banned lead and certain phthalates in children’s toys, increased funding and enforcement authority for CPSC, required manufacturers to place tracking labels on children’s products, made mandatory the requirements of the American Society for Testing and Materials toy safety standard (ASTM F963) and required that testing of children’s products be conducted by accredited third-party laboratories.<sup>97</sup>

While CPSIA set stricter standards for lead and six phthalates in children’s products, it failed to address the larger number of unregulated and insufficiently regulated chemicals in children’s products.<sup>98,99</sup>

When it comes to toys, for many known toxic chemicals or materials, such as organotins, no regulatory standards are in place.<sup>100</sup>

### **Toys “R” Us’ Commitment to Reduce PVC and Offer More PVC-Free Products**

On February 15, 2008, after strong consumer pressure from a coalition of environmental health, labor and public interest groups including CHEJ, the Ecology Center, the Service Employees International Union (SEIU), and the Working

#### **PVC Market Shift**

In response to PVC’s hazardous lifecycle, major corporations are phasing out PVC in favor of safer alternatives. Companies including Wal-Mart, Target, Sears Holdings, Microsoft, Johnson & Johnson, IKEA, Nike, Apple, HP, Dell, Procter & Gamble, Clorox, Firestone Building Products and many others have taken significant steps to reduce or phase out PVC.<sup>93</sup> More than 100 hospitals and health care providers have pledged to reduce or phase out PVC and/or the phthalate DEHP.<sup>94</sup> Several municipalities across the country including New York City, Boston, Seattle, Buffalo and San Francisco have enacted procurement policies to reduce the purchase of products like PVC that lead to release of persistent toxic pollutants such as dioxin.<sup>95</sup>

Families Party, Toys “R” Us agreed to reduce the sale of PVC toys and offer more PVC-free products.<sup>101</sup> The company stated that it was reducing PVC use and moving toward a goal of offering PVC-free products. Toys “R” Us also announced that, by the end of 2008, juvenile products would be produced without the addition of phthalates.

The company’s statement was perceived as a strong commitment to reduce and phase out PVC over time, and as an acknowledgement of the problematic nature of PVC and the chemicals associated with its lifecycle for the health of children and the environment. A few days after the announcement, on February 19, 2008, the consumer website *Boing Boing* ran a story titled, “Toys “R” Us to Eliminate PVC, Ni-Cad Batteries from Toys.”<sup>102</sup>

### **Chapter 3: Testing of Toys Purchased at Toys “R” Us**

To determine whether Toys “R” Us has kept its promise to parents and families to reduce the use of PVC and offer more PVC-free products, CHEJ and the International Brotherhood of Teamsters commissioned the Ecology Center from Ann Arbor, Mich. to conduct a two-phased investigation of toys, and children and infant products sold by Toys “R” Us and Babies “R” Us in their retail stores.

The Ecology Center publishes the HealthyStuff.org website and conducts testing of children’s and consumer products for the presence of hazardous chemicals of concern. They have tested thousands of products for the presence of PVC, including toys, pet products, automobile interiors, school supplies, apparel and accessories, and home improvement materials in homes.<sup>103</sup>

Testing was done using a portable X-Ray Fluorescence (XRF) analyzer. The XRF is an accurate device that has been used by EPA to screen packaging; the Food and Drug Administration (FDA) to screen food; and many state and county health departments to screen for residential lead paint.<sup>104,105,106</sup> XRF methodology can identify the presence of chemicals such as lead, tin, cadmium, chlorine and others in a wide variety of situations. See Appendix A for a detailed discussion of the XRF testing methodology.

#### **Testing of Toys and Packaging from Toys “R” Us Retail Stores**

Toy samples and packaging were collected on two occasions from Toys “R” Us retail stores for analyses with the XRF analyzer. The initial round of testing focused only on toys related to the popular feature length motion picture “Toy Story 3” and was limited to collecting nine (9) different toys or samples. The second round of testing was in the fall of 2010 and involved a broad collection of 60 randomly selected samples from Toys “R” Us and Babies “R” Us. In both rounds of sampling, each toy was analyzed over multiple areas for up to 25 potential contaminants. We report the highest level detected for each chemical of concern in the product as a whole (regardless of how many components the product has). In this investigation, we only report on the presence of four potential contaminants—chlorine, tin, lead and cadmium, as they are most relevant to toys. The packaging of seven (7) of the first-round samples and forty-four (44) of the fall 2010 samples were also analyzed. The full test results are available upon request by contacting CHEJ.

The presence of high concentrations of chlorine in the samples is considered a surrogate for finding PVC as PVC is the only common plastic made with chlorine. Similarly, the presence of tin in the samples is considered a surrogate for the presence of organotins as they are commonly used in PVC products as an additive. Organotins, lead and cadmium are used as stabilizers in PVC to prevent degradation from heat during processing and from exposure to ultraviolet light during the useful life of a product. We did not test for the presence of phthalates, which are common additives found in many PVC products. This investigation does not provide a measure of health risk or chemical exposure associated with any individual product, or any individual element or related chemical.

## **Toys Tested are Representative of Products Sold at Toys “R” Us**

The toys we tested were randomly selected and are representative of the types of toys sold by Toys “R” Us. They include toys marketed for a variety of age groups, different types of products (i.e. balls, dolls, figurines, baby functional items), and were manufactured or marketed by well-known companies and brands (i.e. Disney, Nickelodeon, Marvel, Hasbro, Mattel, etc.). We selected toys in the first round because they were all from a new popular movie, “Toy Story 3.” The second round was designed to collect a broader range of toys and products sold at both Toys “R” Us and Babies “R” Us stores.

## **Testing of ‘Toy Story 3’ Toys Sold at Toys “R” Us Stores**

A random selection of “Toy Story 3” toys were purchased at a Toys “R” Us retail store in Ann Arbor, Mich. on June 15, 2010. These toys were tested as they were the newest merchandise from a well-known brand to come onto market. A total of nine (9) different toys were purchased and analyzed for the presence of chlorine, tin, lead, cadmium, and a range of elements and metals. The packaging of seven (7) of these samples were analyzed for these same contaminants. Detection of high levels of chlorine in a toy component indicates the likely presence of PVC. Detection of tin indicates the likely presence of organotins used in PVC products to stabilize the product. Tables 1 and 2 summarize the testing results. The full test results are available upon request by contacting CHEJ.

**Table 1: ‘Toy Story 3’ Product Testing Results**  
**(Concentrations in parts per million or ppm)**

<b>Name of Product</b>	<b>Component Area Tested</b>	<b>Chlorine (indicating likely made of PVC)</b>	<b>Tin (indicating likely use of organotins)</b>	<b>Cadmium</b>	<b>Lead</b>
Tub Time Friends	Buzz	344,894	<LOD	<LOD	<LOD
Bucket O Soldiers	Army Man	287,652	<LOD	<LOD	<LOD
Lotso with Sparks and Chunk	Blue Robot	220,006	<LOD	<LOD	<LOD
Defender Buzz Lightyear Figure	Buzz Body	270,233	<LOD	<LOD	<LOD
Twitch Figure	Green/Orange Plastic	73,889	<LOD	<LOD	<LOD
Round 'Em Up Sheriff Woody Figure	Lasso	<LOD	<LOD	71	<LOD
Buzz and Wody figures	Buzz-White Green	244,992	<LOD	<LOD	<LOD
Great Shape Barbie	Barbie Hair	550,000	<LOD	<LOD	<LOD

Buzz Lightyear Water Blasters	Gun-Purple/White	<LOD	<LOD	<LOD	11
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Note: <LOD = below the limit of detection.

### **Summary of Toy Story 3 Product Testing Results**

- 9 toys/children products were tested.
- 77.8% of toys (7/9) contained high levels of chlorine, indicating the toys were most likely made out of PVC. Almost all of them were not labeled as containing PVC.
- 11.1% (1/9) of toys tested contained low levels of cadmium and lead.
- None of the toys contained detectable levels of tin.

**Table 2: Toy Story 3 Packaging Testing Results**  
**(Concentrations in parts per million or ppm)**

Name of Product	Component Area Tested	Chlorine (indicating likely made of PVC)	Tin (indicating likely use of organotins)	Cadmium	Lead
Tub Time Friends	Packaging	550,000	980	<LOD	<LOD
Lotso with Sparks and Chunk	Packaging	550,000	1,976	<LOD	<LOD
Defender Buzz Lightyear Figure	Packaging	550,000	2,359	<LOD	<LOD
Twitch Figure	Packaging	550,000	1,953	<LOD	<LOD
Round 'Em Up Sheriff Woody Figure	Packaging	550,000	2,070	<LOD	<LOD
Buzz and Woody figures	Packaging	550,000	1,515	<LOD	<LOD
Great Shape Barbie	Packaging	550,000	1,789	<LOD	<LOD

Note: <LOD = below the limit of detection.

### **Summary of Toy Story 3 Packaging Testing Results**

- 7 “Toy Story 3” packaging materials were tested.
- Every single toy’s packaging contained high levels of chlorine, indicating the packaging was most likely made of PVC.
- Every single one of the products’ packaging contains tin, indicating the likely use of organotins in the packaging material.
- None of the packaging materials contained detectable levels of lead or cadmium.

**Fall 2010 Testing of Toys Purchased at Toys “R” Us Stores**

Following up on the “Toy Story 3” testing, we commissioned the Ecology Center to conduct another more extensive round of testing to further determine whether or not chlorine/PVC and organotins were present in a wider range of toys and packaging sold by Toys “R” Us, or whether the PVC was unique to the “Toy Story 3” products.

A total of 60 toys/children and infant products were randomly selected and purchased from two stores. On August 31, 2010, 52 toys/children products were purchased from a Toys “R” Us store in Rockville, Md. and on September 6, 2010, eight toys and infant products were purchased from a Babies “R” Us store in Silver Spring, Md. The purchased toys and products were all shipped to the Ecology Center in Ann Arbor and analyzed for up to 25 contaminants. The packaging of forty-four (44) of these samples were analyzed for these same contaminants. We report on the presence of chlorine, tin and lead, and cadmium in these samples. Detection of high levels of chlorine in a toy or product component indicates the likely presence of PVC. Detection of tin indicates the likely presence of organotins used in PVC products to stabilize the product. Tables 3 and 4 summarize the test results.

**Table 3: Fall 2010 Product Testing Results**  
**(Concentrations in parts per million or ppm)**

Name of Product	Component Test Area	Chlorine (indicating likely made of PVC)	Tin (indicating likely use of organotins)	Cadmium	Lead
ZHU ZHU PETS HAMSTER HANGOUT	Yellow Zipper	<LOD	<LOD	<LOD	<LOD
KUNG ZHU BATTLE HAMSTER NINJA WARRIORS THORN	Hamster Fur	<LOD	214	<LOD	<LOD
ZHU ZHU HAMSTER V4 JINX 10.8	Hamster Fur	<LOD	<LOD	<LOD	9
KUNG ZHU BATTLE HARMOR RIVET/THUNDER STRIKE	Green Armor Toy	<LOD	<LOD	<LOD	<LOD
HANDY MANNY FIGURE PACK ABUELITO'S BOAT	Young Boy Body	262,859	<LOD	<LOD	<LOD
SMURFS BAKERY PACK	Small Cake White Frosting	232,563	1,894	<LOD	<LOD
DISNEY CLUB PENGUIN 2 INCH MIX 'N MATCH FIGURE PACK	Rocker Penguin Body	191,891	319	<LOD	<LOD
SPONGEBOB SQUAREPANTS SWITCH 'EM UP SPONGEBOB POSABLE PAL	Hamburger Bun	191,220	3,149	<LOD	<LOD
DISNEY BABY EINSTEIN TABLE TOPPER DISPOSABLE	Table Topper Orange Plastic	<LOD	<LOD	<LOD	12



PLACEMATS ECO-FRIENDLY PRODUCT & PACKAGE					
DISNEY PRINCESS ROYAL GIGGLES CINDERELLA	Doll's Flesh Body	407,122	<LOD	<LOD	<LOD
SESAME STREET ON-THE-GO PURSE	Pink Plastic Purse	<LOD	<LOD	<LOD	<LOD
DORA'S FANTASY ADVENTURES - NICKELODEON	Dora Brown Hair	203,644	381	<LOD	<LOD
IMAGINEXT -FIREFIGHTERS FIGURES (3)	Yellow Belt on Firefighter	127,400	<LOD	<LOD	<LOD
NIHAO KAILAN AND RINTOO - WINTER	Yellow Animal	201,246	363	<LOD	<LOD
NIHAO KAILAN AND LULU - SLEEPOVER	Girl Back of Head	173,194	408	<LOD	<LOD
SPOUT COVER	Orange Body Fish	411,842	<LOD	<LOD	<LOD
BATH BOOK	Green Cover Bath Book	<LOD	292	<LOD	<LOD
SASSY SNAP & SQUIRT SEA CREATURES-9 SUITERS AND FISH BOWL TOTE	Orange Crab	408,941	<LOD	<LOD	<LOD
INFLATABLE BATH TUB - ESPECIALLY FOR BABY	Red Crab Plastic Bath Tub	341,956	<LOD	<LOD	<LOD
25 DISPOSABLE PLACEMATS	Green Dinosaur Placemat	<LOD	<LOD	<LOD	<LOD
MINI DUCKS -MUNCHKIN	Yellow Body of Duck	374,604	<LOD	<LOD	<LOD
BATHTIME KNEELING PAD - FISHER PRICE	White Vinyl Underside	504,799	<LOD	<LOD	<LOD
BATH SQUIRT TOYS - ESPECIALLY FOR BABY	Green Back on Frog	375,463	<LOD	<LOD	<LOD
MY NAME SIPPY CUPS - JOHN HINDE	White & Black Skull on Side	258,743	<LOD	<LOD	<LOD
INFLATABLE SAFETY DUCK TUB - MUNCHKIN	Yellow Duck Head	469,526	<LOD	<LOD	<LOD
NICKELODEON'S DORA THE EXPLORER - BAG -REACH FOR THE STARS	Dora's Flesh colored Face on Front	550,000	<LOD	<LOD	<LOD
NICKELODEON'S DORA THE EXPLORER - ICE SKATER	Doll's Turquoise Skirt	309,979	<LOD	<LOD	<LOD
NICKELODEON'S DORA THE EXPLORER -BOOTS & ISA - PART OF DORA WINDOW SURPRISES DOLLHOUSE COLLECTION	Yellow Hat on Boots	332,845	<LOD	<LOD	<LOD

POCOYO - PATO POCOYO ELLY	Blue Feet on Boy	358,222	178	<LOD	<LOD
MISTERY MATES MEDIEVAL SCOOBY & THE CREEPER - SCOOBY DOO	Silver Armor on Scooby	191,448	783	<LOD	<LOD
DISNEY MICKEY MOUSE CLUBHOUSE - MICKEY (MUSICIAN)	Back of Mickey's Head	26,683	<LOD	<LOD	<LOD
DISNEY MICKEY MOUSE CLUBHOUSE - MICKEY (FIREFIGHTER)	Yellow Hose	354,925	<LOD	<LOD	<LOD
IRON MAN ARMORED ADVENTURES	Iron Man Yellow Body	145,797	3,215	<LOD	<LOD
FLASHING ATOM BALL	Orange Atom Point	<LOD	<LOD	<LOD	<LOD
MAUI TOYS WATER BOUNCER - BALL	Label and Water Ball	<LOD	<LOD	<LOD	<LOD
GLITTER INFLATED BALL	Outside of Glitter Ball	258,735	<LOD	<LOD	<LOD
SPORTS BALL - BASKETBALL (MINI)	Outside of Basketball	347,811	<LOD	<LOD	<LOD
SPORTS BALL - SOCCER BALL (MINI)	White Section of Soccer Ball	550,000	<LOD	<LOD	<LOD
YOU & ME BABY ON THE GO - & TOTE BAG	Plastic on Bag	550,000	<LOD	<LOD	<LOD
POLLY POCKET + SQUIRRELULAR PHONE FASHIONS POLLY POCKET POP'N LOCK FASHIONS 10+ PIECES	Pink Dress on Polly	<LOD	<LOD	<LOD	<LOD
TATTOODLES PRINCESS SURPRISE	Plastic of Doll	339,966	<LOD	<LOD	<LOD
SIZZLIN' COOL FISH SQUIRTS	Yellow Fish	345,249	<LOD	<LOD	<LOD
RUBBER DUCK FAMILY	Yellow Duck	406,359	<LOD	<LOD	<LOD
SESAME STREET ELMO FAUCET COVER	Red Elmo Head	269,906	<LOD	<LOD	<LOD
YOU & ME TAKE ALONG BABY	Plastic Body	395,984	<LOD	<LOD	<LOD
TUB TOYS - TOTE	Red Fish	512,694	<LOD	<LOD	<LOD
MERMAID DOLL	Skin on Back	294,746	<LOD	<LOD	<LOD
YOU & ME KISS & BABBLES BABY	Baby's Body	364,525	<LOD	<LOD	<LOD

ANIMAL PLANET BARNYARD PLAYSET	Green Tree Canopy	393,642	565	<LOD	<LOD
GEOTRAX GAS N' GO STATION	Red Plastic Roof	<LOD	<LOD	<LOD	<LOD
ANIMAL PLANET STRETCHY DRAGON	Dragon Body-Underside	<LOD	<LOD	<LOD	51
SQUEEZABLE FROG	Yellow Body	<LOD	<LOD	<LOD	<LOD
HANFUL OF HEROES MARVEL UNIVERSE	Yellow Figure	352,541	3,127	<LOD	<LOD
IRON MAN 2 MINIMATES MARVEL UNIVERSE 2 PACK MARK V IRON MAN -WAR MACHINE	Gray Figure	207,794	737	<LOD	<LOD
BATMAN THE BRAVE AND THE BOLD ACTION LEAGUE - BATMAN VS THE DEMON ETRIGAN FIGURES DC	Black Cape	217,788	<LOD	<LOD	<LOD
MARVEL SUPERHERO SQUAD - GREEN GOBLIN SPIDER-MAN	Purple Cape	339,699	<LOD	<LOD	<LOD
LITTLE PEOPLE NOAH'S ANIMALS	Cheetah	494,484	<LOD	<LOD	<LOD
JUST LIKE HOME PLAY FOOD SET + BACKPACK - MCDONALDS	Cheese	<LOD	<LOD	<LOD	<LOD
JUST LIKE HOME FRYING PAN PLAYSET + FRYING PAN	Frying Pan Lid	<LOD	<LOD	<LOD	<LOD
KOALA BABY BIB	Pink Cloth Boarder	<LOD	<LOD	<LOD	<LOD

*Note: <LOD = below the limit of detection.*

**Table 4: PVC and Organotins Analyses Based on Fall 2010 Toy Types**

<b>Product Type</b>	<b>Number of Products</b>	<b>Percentage of Toys Containing Chlorine (indicating likely made of PVC)</b>	<b>Percentage of Toys Containing Tin (indicating likely use of organotins)</b>
Infant & Baby Feeding	4	25%	0%
Bath Time	11	91%	9%
Animal	7	29%	14%
Dramatic Play	3	0%	0%
Ball	5	60%	0%
Doll	8	87.5%	0%
Figurine	22	95%	50%
All product types	60	71.7%	23.3%

**Table 5: Percentage of Fall 2010 Toys Containing Chlorine and Tin by Age Group**

<b>Suggested toy age groupings</b>	<b>Number of Products</b>	<b>Percentage Containing Chlorine (indicating likely made of PVC)</b>	<b>Percentage Containing Tin (indicating likely use of organotins)</b>
3 months and up to 12 months and up	15	67%	7%
18 months and up to 36 months and up	32	81%	19%
4 years and up to 8 years and up	13	62%	46%
<i>The age groupings were identified on the toy packaging and are listed as the appropriate age levels for the toys.</i>			

**Summary of Fall 2010 Toy Test Results**

- 60 toys/children’s products were tested.
- 71.7% of toys (43/60) contained high levels of chlorine, indicating the toy was most likely made of PVC. However only one of those toys was labeled indicating it was made of PVC.
- 23.3% (14/60) of toys contained tin, indicating the toys most likely contained organotins.

- Of those toys that contained tin, 85.7% (12/14) also contained high levels of chlorine which indicate the toy was likely made of PVC.
- 67% of toys marketed to infants 3 to 12 months and up in age contained chlorine, indicating the toy was likely made of PVC. 17% of those age-group toys contained tin, indicating likely use of organotins.
- 81% of toys for children 18 to 36 months and up in age contained chlorine, indicating the toy was likely made of PVC. 19% of those age-group toys contained tin, indicating likely use of organotins.
- 62% of toys for children 4 to 6 years and up in age contained chlorine, indicating the toy was likely made of PVC. 46% of those age-group toys contained tin, indicating likely use of organotins.
- 5% (3/60) of the toys contained low levels of lead.
- None of the toys tested had detectable levels of cadmium.

**Table 6: Fall 2010 Packaging Testing Results**  
**(Concentrations in parts per million or ppm)**

<b>Name of Product</b>	<b>Component Test Area</b>	<b>Chlorine (indicating likely made of PVC)</b>	<b>Tin (indicating likely use of organotins)</b>	<b>Cadmium</b>	<b>Lead</b>
ZHU ZHU PETS HAMSTER HANGOUT	Decal Front Packaging	454,499	<LOD	<LOD	<LOD
KUNG ZHU BATTLE HAMSTER NINJA WARRIORS THORN	Clear Front Packaging	<LOD	<LOD	<LOD	<LOD
ZHU ZHU HAMSTER V4 JINX 10.6	Clear Front Packaging	<LOD	<LOD	<LOD	<LOD
KUNG ZHU BATTLE HARMOR RIVET/THUNDER STRIKE	Clear Front Packaging	<LOD	<LOD	<LOD	<LOD
HANDY MANNY FIGURE PACK ABUELITO'S BOAT	Clear Inside Packaging	550,000	1,838	<LOD	<LOD
SMURFS BAKERY PACK	Clear Front Packaging	550,000	1,693	<LOD	<LOD
DISNEY CLUB PENGUIN 2 INCH MIX 'N MATCH FIGURE PACK	Clear Inside Packaging	550,000	1,363	<LOD	<LOD
SPONGEBOB SQUAREPANTS SWITCH 'EM UP SPONGEBOB POSABLE PAL	Clear Front Packaging	550,000	1,259	<LOD	<LOD

DISNEY BABY EINSTEIN TABLE TOPPER DISPOSABLE PLACEMATS ECO_FRIENDLY PRODUCT & PACKAGE	Outside Blue Packaging	<LOD	<LOD	<LOD	<LOD
DISNEY PRINCESS ROYAL GIGGLES CINDERELLA	Purple Cardboard Packaging	<LOD	<LOD	<LOD	11
SESAME STREET ON-THE- GO PURSE	Yellow Inside Plastic Packaging	550,000	1,828	<LOD	<LOD
DORA'S FANTASY ADVENTURES - NICKELODEON	Clear Front Packaging	550,000	226	<LOD	<LOD
IMAGINEXT - FIREFIGHTERS FIGURES (3)	Clear Plastic Front Packaging	550,000	1,986	<LOD	<LOD
NIHAO KAILAN AND RINTOO -WINTER	Plastic Inside Packaging	550,000	192	<LOD	<LOD
NIHAO KAILAN AND LULU -SLEEPOVER	Yellow Inside Cardboard (Inside Box)	<LOD	<LOD	<LOD	<LOD
SPOUT COVER	Green Cardboard Packaging	<LOD	<LOD	<LOD	<LOD
BATH BOOK	Plastic Packaging	<LOD	<LOD	<LOD	<LOD
SASSY SNAP & SQYUIRT SEA CREATURES-9 SUIRTERS AND FISH BOWL TOTE	Blue Cardboard Packaging	<LOD	<LOD	<LOD	<LOD
INFLATABLE BATH TUB - ESPECIALLY FOR BABY	Green Cardboard	<LOD	<LOD	<LOD	20
22 DISPOSABLE PLACEMATS	Cardboard Yellow Package	<LOD	<LOD	<LOD	<LOD
MINI DUCKS -MUNCHKIN	Pink Cardboard and Plastic Outside Packaging	<LOD	930	<LOD	<LOD
BATHTIME KNEELING PAD -FISHER PRICE	Green Cardboard Packaging	<LOD	<LOD	<LOD	<LOD
BATH SQUIRT TOYS - ESPECIALLY FOR BABY	Cardboard Packaging	<LOD	<LOD	<LOD	<LOD
INFLATABLE SAFETY DUCK TUB - MUNCHKIN	Yellow Cardboard Box	<LOD	<LOD	<LOD	<LOD
NICKELODEON'S DORA THE EXPLORER - ICE SKATER	Yellow Back Cardboard Packaging	<LOD	<LOD	<LOD	<LOD

NICKELODEON'S DORA THE EXPLORER -BOOTS & ISA - PART OF DORA WINDOW SURPRISES DOLLHOUSE COLLECTION	Plastic Packaging	550,000	2,030	<LOD	<LOD
POCOYO - PATO POCOYO ELLY	Clear Plastic Outside Packaging	550,000	2,076	<LOD	<LOD
MISTERY MATES MEDIEVAL SCOOPY & THE CREEPER - SCOOPY DOO	Clear Plastic Outside Packaging	550,000	566	<LOD	<LOD
DISNEY MICKEY MOUSE CLUBHOUSE - MICKEY (MUSICIAN)	Clear Plastic Outside Packaging	550,000	1,684	<LOD	<LOD
IRON MAN ARMORED ADVENTURES	Plastic on Outside Packaging	550,000	1,781	<LOD	<LOD
POLLY POCKET + SQUIRRELULAR PHONE FASHIONS POLLY POCKET POP'N LOCK FASHIONS 10+ PIECES	Plastic Packaging	550,000	1,479	<LOD	<LOD
TATTOODLES PRINCESS SURPRISE	Plastic Packaging	<LOD	<LOD	<LOD	<LOD
SIZZLIN' COOL FISH SQUIRTS	Plastic Packaging	<LOD	<LOD	<LOD	<LOD
SESAME STREET ELMO FAUCET COVER	Green Cardboard	<LOD	<LOD	<LOD	<LOD
MERMAID DOLL	Plastic Packaging	<LOD	<LOD	<LOD	<LOD
YOU & ME KISS & BABBLES BABY	Pink Cardboard Packaging	<LOD	<LOD	<LOD	<LOD
ANIMAL PLANET BARNYARD PLAYSET	Green Cardboard Packaging	<LOD	<LOD	<LOD	28
GEOTRAX GAS N' GO STATION	Red Cardboard Packaging	<LOD	<LOD	<LOD	<LOD
HANFUL OF HEROES MARVEL UNIVERSE	Plastic Packaging	550,000	1,334	<LOD	<LOD
IRON MAN 2 MINIMATES MARVEL UNIVERSE 2 PACK MARK V IRON MAN -WAR MACHINE	Plastic Packaging	550,000	508	<LOD	<LOD

BATMAN THE BRAVE AND THE BOLD ACTION LEAGUE - BATMAN VS THE DEMON ETRIGAN FIGURES DC	Plastic Packaging	550,000	818	<LOD	<LOD
MARVEL SUPERHERO SQUAD - GREEN GOBLIN SPIDER-MAN	Plastic Packaging	550,000	2,326	<LOD	<LOD
LITTLE PEOPLE NOAH'S ANIMALS	Plastic Packaging	550,000	1,868	<LOD	<LOD
KOALA BABY BIB	Brown Plastic Package	<LOD	<LOD	<LOD	<LOD

*Note: <LOD = below the limit of detection.*

### **Summary of Fall 2010 Packaging Results**

- 44 toy-packaging materials were tested.
- 45.5% (20/44) of toy packaging contained high levels of chlorine, indicating the packaging was most likely made out of PVC.
- 45.5% (20/44) of toy packaging contained tin, indicating the likely presence of organotins.
- Of those toys that contained tin, 95% (19/20) also contained high levels of chlorine which indicates that the packaging was likely made of PVC.
- 6.8% (3/33) of the toy packaging materials contained low levels of lead.
- None of the toy packaging materials tested had detectable levels of cadmium.



## **Chapter 4: Discussion of Toys “R” Us Test Results**

### **Toys “R” Us: Broken Promises to Reduce PVC**

This investigation found that, based on a random selection of toys tested, Toys “R” Us continues to market an extensive selection of toys and infant items that contain high concentrations of chlorine and thus are very likely to be made out of and packaged in PVC, a plastic that is toxic to human health and the environment.

### **PVC in Toys/Children’s Products at Toys “R” Us Stores**

- A total of 69 toys/children products were tested.
- 72.5% (50/69) of these toys/children’s products contained high levels of chlorine, indicating they were most likely made out of PVC.

### **Chemical Additives in Toys/Children’s Products at Toys “R” Us Stores**

- 20.3% (14/69) of all toys tested contained tin, indicating the likely presence of organotins.
- 5.8% (4/69) of all toys tested contained low levels of lead, indicating progress by Toys “R” Us and its suppliers in reducing the use of lead in PVC toys.
- 1.4% (1/69) of toys contained low levels of cadmium, indicating progress by Toys “R” Us and suppliers in reducing the use of cadmium in PVC toys.

### **PVC and Organotins in Toys for Infants and Young Children**

- 67% of the fall 2010 toys for infants 3 to 12 months and up in age contained chlorine, indicating the toy was likely made of PVC. 17% of those age-group toys contained tin, indicating likely use of organotins.
- 81% of the fall 2010 toys for children 18 to 36 months and up in age contained chlorine, indicating the toy was likely made of PVC. 19% of those age-group toys contained tin, indicating likely use of organotins.
- 62% of the fall 2010 toys for children 4 to 6 years and up in age contained chlorine, indicating the toy was likely made of PVC. 46% of those age-group toys contained tin, indicating likely use of organotins.

### **PVC in Toy Packaging at Toys “R” Us Stores**

- 51 toy-packaging materials were tested.
- 52.9% (27/51) of all the toy packaging tested contained high levels of chlorine, indicating they were most likely made out of PVC. Most of them were not labeled as such.

### **Chemical Additives in Toy Packaging at Toys “R” Us Stores**

- 52.9% (27/51) of all the toy packaging tested contained tin, indicating the presence of organotins.

- 5.9% (3/51) of all the packaging tested contained lead, indicating progress in reducing the use of lead in PVC packaging.
- None of the packaging materials contained detectable levels of cadmium, indicating progress by Toys “R” Us and suppliers in reducing the use of cadmium in PVC packaging.

### **Toys Made in China**

- 98% of the toys in the fall 2010 testing were made in China

### **Inadequate Labeling of Toys and Packaging**

- In the fall 2010 testing, only one of the 60 products was labeled as containing PVC. This label was hidden under cardboard packaging and evident only after purchase.
- None of the products we tested were labeled as containing organotins, lead or cadmium.
- Of the toy packaging, 91% had no markings or labels that could help a consumer identify the plastic. Only two packages had a PVC marking, but this was on the bottom, hard to see and required extensive inspection.

Toys that tested positive for PVC include Barbie, Toy Story 3 Woody and Buzz Lightyear figures, Disney Princess Royal Giggles doll, Zhu Zhu Pets Hamster Hangout, Nickelodeon’s Dora the Explorer and Diego figures, Sesame Street Elmo Faucet Cover, Club Penguin figurines, Imaginext toddler action figures and many others, from dolls and balls, to baby bath time toys and products, and even My Name Sippy Cups.

### **Progress in Removing Lead from Toys and Packaging**

The results of the study indicate that toy manufacturers and retailers like Toys “R” Us have made progress in reducing, though not eliminating, the use of lead in children’s toys. The Consumer Product Safety Improvement Act (CPSIA) passed in 2008 also had a significant impact in reducing the use of lead in the global toy supply chain. We found 5.8% of all the toys and children’s products we tested contained lead and 1.4% contained cadmium. Similarly, 5.9% of the packaging we tested contained lead and none of the packaging samples we tested contained cadmium. This is certainly good news for parents concerned about purchasing toys that may pose health risks for their children.

### **The Toxic Shell Game: Organotins Used to Replace Lead and Cadmium**

Both rounds of testing found elevated levels of tin in a significant portion of the PVC toys and packaging we tested, indicating the likely use of organotins to stabilize the products. Organotins were introduced to replace toxic metal stabilizers like lead and cadmium, but they have also been found to leach from PVC products.<sup>107,108</sup> The organotins are also toxic (see Chapter 1 for a discussion of the hazards of organotins).

Whether it’s organotins or lead, these and other additives are needed to make PVC toys, packaging or other products. Without the additives, PVC cannot be made into toys or other

products. The additives make the product. The best approach to avoiding the various toxic additives is to avoid toys and products made of PVC.

### **Limitations of Testing**

Our investigation did not test nearly all of the thousands of products sold by Toys “R” Us. Nor did we test from a wide range of different locations. Our tests samples were collected from one store located in Ann Arbor, Mich. and two stores in suburban Maryland. We were also not able to directly measure for the presence of PVC or organotins. However, we are confident that the presence of high concentrations of chlorine indicates the presence of PVC as there are very few plastic types that contain chlorine. We also found a substantial percentage of toys and packaging containing tin, indicating the presence of organotins. We did not measure the migration of organotins, lead and cadmium from the toys or packaging materials. Since the XRF analyzer penetrates about ¼ inch into plastic, these measurements should be considered a surface or near-surface measurement.

Our investigation did not test for the presence of phthalates, which are hazardous chemical additives common in PVC products. Toys “R” Us has pledged to phase out the use of phthalates in their products, and Congress has banned certain phthalates in children’s toys. We were not able to ascertain Toys “R” Us’ compliance with these initiatives. We also did not test for other hazardous chemicals that have been found in children’s and infant products such as bisphenol A. This investigation does not provide a measure of health risk or chemical exposure associated with any individual product, or any individual element or related chemical.

## **Chapter 5: Inadequate Labeling and Lack of Transparency**

Most of the Toys “R” Us toys we found to be made out of PVC were not labeled as such on the product or packaging. In the fall 2010 testing, only one of the 60 products was labeled as containing PVC. This label was hidden under cardboard packaging and evident only after purchase. None of the products were labeled as containing organotins. This makes it nearly impossible for parents to identify what materials toys are made out of and make informed decisions for the health of their families.

### **Online Review of ToysRUs.com**

We conducted an online search on October 21, 2010 to determine whether one can identify PVC and PVC-free products through the Toys “R” Us website. The Toys “R” Us’ online catalog can be searched by using various keywords. We searched the website using the terms “PVC-free,” “PVC” and “All.” The search engine is case-insensitive.

<b>Online Search Term</b>	<b>Items Recovered</b>
PVC-free	10
PVC	36 (including 10 PVC-free)
All (possible products)	6,211

**While there are more than 6,000 products accessible online, only 36 were labeled as “PVC” or “PVC-free.” Of the toys we tested, however, 72.5% of toys/children’s products contained high levels of chlorine indicating that they were most likely made out of PVC.**

### **Online Review of Babies “R” Us**

We conducted a similar online search on the Babies “R” Us website on October 21, 2010. We found:

<b>Online Search Term</b>	<b>Items Recovered</b>
PVC-free	10
PVC	11 (including the PVC-free)
All	507

While there are more than 500 products available online, our random search only found one product that was labeled as being made with “PVC” and another 10 products that were labeled as being “PVC-free.”

### **Discussion of Online Searches**

Toys “R” Us prides itself in being “a leader in web search results for toys and baby goods, driving increased traffic to the company’s e-commerce businesses and providing parents and gift givers with a wide assortment of the most sought-after products.”<sup>109</sup> As parents can readily

access Toys “R” Us and related companies’ online catalogs, consumers can easily find information on the price, availability, photos, customer reviews and key characteristics. There is no reason why Toys “R” Us cannot incorporate information regarding which toys do and do not contain PVC on its website. As our recent toy testing has shown, the lack of a PVC label does not mean the product is PVC-free.

By failing to label PVC plastic products as such, Toys “R” Us is denying parents the right to know what is in the products they buy for their children.

## **Chapter 6: The Dangers of PVC Used to Manufacture Toys “R” Us Toys**

The manufacture and disposal of PVC products such as toys poses environmental health hazards to communities and workers in and near plants. These next two chapters discuss some of these hazards and why it’s important to eliminate PVC in toys and packaging. Eliminating PVC in toys and children’s products will reduce the need for PVC and lower the production and manufacture of PVC. This will result in fewer workers being exposed to hazardous chemicals generated during production and less toxic pollution in communities located near production facilities.

### **The Production of PVC Involves Cancer-Causing Chemicals**

PVC toys and packaging are made from toxic chlorinated chemicals. Three chemicals are at the core of PVC production: chlorine gas is converted into ethylene dichloride (EDC), which is then converted into vinyl chloride monomer (VCM), which is then converted into PVC.<sup>110</sup>

Vinyl chloride is one of the highest production volume chemicals in the world, with a current worldwide demand of roughly 16 billion pounds annually.<sup>111</sup> Approximately 98% of all vinyl chloride produced is used to make PVC.<sup>112</sup> Vinyl chloride is one of the few chemicals the U.S. EPA classifies as a known human carcinogen.<sup>113</sup> Vinyl chloride causes a rare form of liver cancer and damages the liver and central nervous system.<sup>114</sup> Vinyl chloride is classified as a human carcinogen by the International Agency for Research on Cancer and the U.S. National Toxicology Program.<sup>115, 116</sup>

Ethylene dichloride is a probable human carcinogen that also affects the central nervous system and damages the liver.<sup>117</sup> According to the EPA, “Inhalation of concentrated ethylene dichloride vapor can induce effects on the human nervous system, liver, and kidneys, as well as respiratory distress, cardiac arrhythmia, nausea, and vomiting. Chronic (long-term) inhalation exposure to ethylene dichloride produced effects on the liver and kidneys in animals...Decreased fertility and increased embryo mortality have been observed in inhalation studies of rats.”<sup>118</sup>

While children are not exposed to EDC and VCM in the finished product, these chemicals are hazardous to the workers and surrounding communities, but not to children handling the packaging or toys.

### **The Production of PVC Poses Workplace Hazards**

Workers in plants that manufacture PVC or its feedstocks receive the highest exposures to vinyl chloride and ethylene dichloride in workplace air.<sup>119,120</sup> PVC workers are also regularly exposed to toxic phthalates such as di(2-ethylhexyl)phthalate (DEHP), which are used to soften or plasticize PVC products.<sup>121</sup> According to the National Toxicology Program, “workers may be exposed to relatively high concentrations during the compounding of DEHP with PVC resins. The major route of exposure is inhalation.”<sup>122</sup> Studies have documented links between working in PVC facilities and the increased likelihood of developing diseases including angiosarcoma, a rare form of liver cancer,<sup>123</sup> brain cancer,<sup>124</sup> lung and liver cancer,<sup>125,126</sup> lymphomas, leukemia, and liver cirrhosis.<sup>127</sup> One recent study by researchers at the CDC, the National Institute for Occupational Safety and Health (NIOSH) and the University of Cincinnati found PVC workers are exposed to high levels of phthalates. Workers in the PVC film and compounding sectors had

the highest exceedances over the U.S. reference dose for the phthalate DEHP.<sup>128</sup> In addition to chronic diseases, PVC workers face hazards from accidents and explosions at PVC manufacturing plants.<sup>129,130</sup>

### **PVC Chemical Plants Release Carcinogens into the Air**

Each year, PVC plants in the U.S. pump some 500,000 pounds of vinyl chloride—a known human carcinogen—and many other toxins into the atmosphere.<sup>131,132</sup> All across the world, PVC manufacturers release vinyl chloride into the air. Dioxin is released into the atmosphere from the production and eventual disposal of PVC in incinerators, backyard burn barrels or accidental landfill fires.<sup>133,134</sup> When its entire lifecycle is considered, PVC appears to be associated with the release of more dioxin than any other single product.<sup>135</sup>

### **PVC: Major User of Mercury Globally**

Mercury is primarily used to produce chlorine gas, and in China and Russia, mercury is also used to make vinyl chloride monomer, the basic building block of PVC.<sup>136</sup> This use accounts for an astonishing 20% of global mercury consumption (700 tons), the second-largest sector globally.<sup>137</sup> Mercury is a potent neurological and reproductive toxin that accumulates primarily as methyl mercury in aquatic food chains.<sup>138</sup> The PVC chemical industry's use of mercury has been increasing in recent years. In 2002, the Chinese PVC industry used 354 tons of mercury.<sup>139</sup> Within two years, that had increased to 610 tons, growing at an annual rate of 31.4%. It's been estimated that mercury usage will continue to increase to more than 1,000 tons by 2010.<sup>140</sup> China is the world's biggest user and emitter of mercury.<sup>141</sup> Within China, the single biggest users of mercury are the factories turning coal into PVC.<sup>142</sup>

### **PVC Packaging Contaminates and Ruins Recyclable Plastics**

This investigation found PVC was prevalent in the packaging of toys sold at Toys “R” Us. PVC packaging has a national recycling rate far lower than other plastics. Just 0.7% of PVC bottles were recycled in 2006, compared to 23.5% for PET plastic bottles and 26.4% for HDPE bottles.<sup>143</sup> According to the Association of Postconsumer Plastics Recyclers, “PVC is a major contaminant to the PET bottle recycling stream.”<sup>144</sup> One PVC bottle can contaminate and ruin a recycling load of 100,000 recyclable PET bottles, if the PVC cannot be separated from the PET.<sup>145</sup>

## **Chapter 7: PVC Toys and Dioxin - One of the Most Toxic Chemicals**

Dioxin is the name given to a group of persistent, very toxic chemicals that are not deliberately manufactured but are byproducts of industrial processes that use or burn chlorine, such as the manufacture and disposal of PVC.<sup>146</sup> The most toxic form of dioxin is 2,3,7,8-tetrachlorodibenzo-p-dioxin or TCDD.<sup>147</sup> TCDD is more commonly recognized as the toxic contaminant found in Agent Orange and at Love Canal in New York.

PVC toys and packaging such as those sold by Toys “R” Us can release dioxin into the environment during both the manufacture and disposal of these PVC materials.<sup>157, 158, 159, 160</sup> However, children are not exposed to dioxin when they handle the toys or the packaging.

Dioxin has been targeted for global phase out by the Stockholm Convention on Persistent Organic Pollutants, an international treaty signed by more than 140 nations around the world.<sup>161</sup> Dioxin has also been targeted for virtual elimination in the Great Lakes through the U.S. and Canadian Great Lakes Binational Toxics Strategy.<sup>162</sup>

### **Cancer-Causing Impacts**

Dioxin causes a wide array of adverse health effects in both animals and humans.<sup>163</sup> Dioxin is a potent cancer-causing agent and is considered to be a “human carcinogen” by the World Health Organization’s International Agency for Research on Cancer<sup>164</sup> and the U.S. Department of Health and Human Services’ National Toxicology Program.<sup>165</sup>

### **PVC Toys, Dioxin and Our Food – What’s the Connection?**

According to the EPA, more than 96 percent of human exposure to dioxin occurs through the diet, primarily foods derived from animals.<sup>148</sup> Dioxin in air released by the burning of chlorinated products like PVC in incinerators, backyard burn barrels and other sources settles onto soil, water and plant surfaces.<sup>149, 150, 151, 152</sup> It does not readily break down in the environment and over time accumulates in the grazing animals that eat these plants. People then ingest the dioxin contained in meat, dairy products and eggs.<sup>153</sup> Some exposure also results from eating dioxin-contaminated fish. Dioxin exposure of the general population is a problem of cumulative emissions from many sources.<sup>154</sup>

In 2010, the EPA released a proposed reference dose (RfD) for dioxin.<sup>155</sup> According to the Environmental Working Group, “EWG analysis of data from peer-reviewed scientific reports has found that a breast-fed infant three to six months old, with an average weight of 16 pounds, consumes up to 77 times more dioxin and dioxin-like compounds than the EPA’s proposed safe daily dose (RfD).”<sup>156</sup>

According to the U.S. EPA draft report on dioxin's health effects, the levels of dioxin-like compounds found in the general population may cause a lifetime cancer risk as high as one in 1,000.<sup>166</sup> This is 1,000 times higher than the generally acceptable risk level of one in a million. The human epidemiological evidence provides consistent findings of increased risk for all cancers combined and lung cancer in occupational studies as well as evidence of tissue specific increases in cancer.<sup>167, 168</sup>



## **Non-Cancer Impacts of Dioxin**

Dioxin also causes a wide range of non-cancer effects including reproductive, developmental, immunological, and endocrine effects in both animals and humans.<sup>169</sup> Animal studies show that dioxin exposure is associated with endometriosis, decreased fertility, inability to carry pregnancies to term, lowered testosterone levels, decreased sperm counts, birth defects and learning disabilities.<sup>170,171,172,173,174,175,176,177,178,179,180</sup> In children, dioxin exposure has been associated with IQ deficits, delays in psychomotor and neurodevelopment, and altered behavior including hyperactivity.<sup>181,182,183,184,185,186</sup> Studies in workers have found lowered testosterone levels, decreased testis size, and birth defects in offspring of Vietnam veterans exposed to Agent Orange.<sup>187,188,189</sup>

## **Dioxin and the Immune System**

Effects on the immune system of the developing organism appear to be among the most sensitive endpoints studied. Animal studies show that dioxin decreased immune response and increased susceptibility to infectious disease.<sup>190,191,192,193,194</sup> In human studies, dioxin was associated with immune system depression and alterations in immune status leading to increased infections.<sup>195,196</sup> Dioxin can also disrupt the normal function of hormones—chemical messengers that the body uses for growth and regulation. Dioxin interferes with thyroid levels in infants and adults, alters glucose tolerance and has been linked to diabetes.<sup>197,198,199,200,201</sup>

## **Burning PVC Leads to Dioxin Formation**

A major concern about PVC is the formation of dioxin whenever it is burned. This is due to the relationship between PVC, chlorine and dioxin.<sup>202,203,204,205</sup> PVC is a significant source of the chlorine necessary for dioxin formation during the combustion of municipal and household waste in incinerators, burn barrels, landfills and open dumps.<sup>206,207,208,209</sup> PVC is the leading contributor of chlorine to four combustion sources: municipal solid waste incinerators; backyard burn barrels; medical waste incinerators; and secondary copper smelters that account for an estimated 80% of dioxin air emissions.<sup>210</sup> The strongest evidence of dioxin formation during combustion comes from laboratory studies showing that PVC content in the waste stream fed to incinerators is linked to elevated levels of dioxin in stack air emissions and in residual incinerator ash.<sup>211,212,213,214</sup> More than 100 municipal waste incinerators in the U.S. burn 500 to 600 million pounds of PVC each year, forming highly toxic dioxin and releasing toxic additives to the air and in ash disposed of on land.<sup>215</sup> Dioxin also forms when PVC products and materials are burned in accidental building and vehicle fires.<sup>216,217,218</sup>

## **Dumping PVC in Landfills Leaches Chemicals and Forms Dioxin**

The land disposal of PVC plastic waste, especially flexible materials, also poses environmental and public health risks.<sup>219</sup> Land disposal is the final fate of between 2 and 4 billion pounds of PVC that are discarded every year at some 1,800 municipal waste landfills in the U.S.<sup>220</sup> As flexible PVC degrades in a landfill, toxic additives like organotins, lead, cadmium and phthalates leach out of the waste into groundwater, which is especially problematic for unlined

landfills.<sup>221,222,223,224</sup> These additives also contribute to the formation of landfill gases, which are formed in municipal waste landfills.<sup>225,226,227</sup> There are more than 8,400 landfill fires reported every year in the U.S.<sup>228</sup> These fires burn PVC waste and contribute to dioxin formation.<sup>229</sup> In its most recent dioxin inventory, the EPA estimated U.S. accidental landfill fires may annually contribute as much as 1,126 grams TEQ of dioxin into the ambient air.<sup>230</sup>

## **Chapter 8: Policy and Consumer Recommendations**

### **Based on our investigation, Toys “R” Us and companies that supply them with toys and packaging should implement the following actions:**

- Phase out PVC toys and packaging and switch to safer materials;
- Set clear public benchmarks and timeframes for implementing this phase out;
- Publicly report on its progress in phasing out PVC;
- In the interim, eliminate the purchase of products and packaging that contain organotins and other hazardous chemical additives in toys and children’s products;
- Label the material content of toys so that consumers can easily identify safer products. Toys made with PVC should be labeled “made with PVC.” Toys made without PVC should be labeled “PVC-free.” By requiring all PVC products to be labeled, consumers can readily identify which products contain PVC and its additives and which are safe to purchase; and
- Update its online catalog with information about which toys contain PVC and those that are “PVC-free”

### **Governments at all levels should implement the following actions:**

- Act quickly to adopt policies to protect consumers and ban the use of PVC in toys and children’s products;
- Require warning labels on PVC toys. Labeling would encourage product manufacturers to switch to safer products to avoid labeling requirements;
- Require that PVC toys and other PVC products be collected and diverted from incinerators and burn barrels to reduce the formation of dioxin;
- Treat PVC as a hazardous material that should be separated from regular household waste and disposed in a safe manner. As an interim measure, PVC could be disposed of in “secure” triple-lined hazardous waste landfills; and
- Conduct a public campaign to educate consumers about the risks posed by PVC products such as toys.

### **Testing for Phthalates in Toys**

We recommend the federal government, perhaps the Consumer Product Safety Commission, conduct an investigation into whether Toys “R” Us and other retailers have reduced or eliminated the use of phthalates in children’s toys.

### **The Need for Federal Policy Reform**

PVC and organotins in toys and packaging is one of many examples of the need to reform federal law to protect consumers. As toy manufacturers and retailers have removed lead from PVC toys, they have merely swapped one toxic hazard, lead, for another, organotins. The presence of organotins in toys underscores the need for much broader chemical policy reform. Federal policymakers should reform America’s outdated chemical policies that are failing to protect families from toxic chemicals already on the market that are released in our homes. The

federal law regulating industrial chemicals, the Toxic Substances Control Act (TSCA), is 30 years old, outdated, and simply does not work to protect people and the environment. Of the 62,000 chemicals on the market at the time TSCA passed in 1976, the EPA has only required testing on about 200; and it has only regulated five.

Legislation to revamp the 34-year-old TSCA has been introduced in the U.S. Senate and House of Representatives. Sen. Frank Lautenberg (D-NJ) sponsored S. 3209, the Safe Chemicals Act of 2010, and Reps. Bobby Rush (D-IL) and Henry Waxman (D-CA) have unveiled H.R. 5820, the Toxic Chemicals Safety Act of 2010.<sup>231</sup> TSCA is the outdated law widely acknowledged to have failed in its goal of protecting people and the environment from toxic chemicals in consumer products. The long-awaited, landmark legislation would overhaul the way the federal government regulates chemicals commonly found in our homes, workplaces and communities.

Under the new legislation, chemical manufacturers would have to provide basic health and safety information for chemicals and also demonstrate a chemical's safety in order to keep it on the market. The bills specify a standard of safety that explicitly protects pregnant women, children, and other vulnerable populations. The worst of the worst chemicals—those that build up in the food chain—would be targeted for immediate reduction. Product manufacturers and retailers that already work to reduce toxic chemicals would be given new information to help them achieve their goals. The EPA would also be given a new mandate to identify communities especially hard-hit by toxic chemicals—"hot spots"—and develop action plans to return them to health.

### **Tips for Parents**

- Avoid toys made with PVC, as well as other PVC products, especially those that are flexible. These products are not always labeled, although some may be labeled as "vinyl" or "PVC."
- Purchase PVC-free toys made out of safer materials—such as sustainably harvested wood or plastics that pose fewer environmental health hazards.
- To identify PVC packaging, first look for the universal recycling symbol. If it has the number "3" inside it, or the letters "V" or "PVC" underneath it, you know the product is made out of PVC.
- Some products are not properly labeled, making it impossible to determine whether they contain PVC. If you're uncertain, e-mail or call the 1-800 number of the manufacturer or retailer and ask what type of plastic their product is made of. You have the right to know.

## **Appendix A: X-Ray Fluorescence (XRF) Testing Methodology**

The toys were tested by the Ecology Center in Ann Arbor, Mich. using a portable X-ray Fluorescence (XRF) analyzer. XRFs are widely used by both product manufacturers and government regulators to screen consumer products for hazardous chemicals. XRFs, like all test methods, have limitations. These hand-held devices have been used for years to measure the presence of lead and other metals and elements in homes and consumer products without destroying the sample being analyzed.<sup>232,233,234,235</sup> The following is an overview of the product testing methodology.

### **XRF Testing Methodology**

Products were tested using a handheld X-ray fluorescence (XRF) device manufactured by Innov-X Systems. The XRF analyzer uses a technology known as X-ray fluorescence spectrometry to measure the atomic composition of material. It can detect chemical elements, such as chlorine, lead, cadmium, arsenic, mercury, tin and antimony. A simple description of how the analyzer works is provided by the Ecology Center on their website.<sup>236</sup> Abstracts of scientific papers describing the use of the XRF analyzer is also provided on their website.<sup>237</sup>

The elemental composition of the materials reveals the presence of potentially hazardous chemicals, such as metals, and allows researchers to infer the possible presence of toxic chemicals or materials, including polyvinyl chloride (PVC). There are a number of chemicals of concern that cannot be detected by this technology, such as phthalate plasticizers and bisphenol A (BPA).

The exact XRF device sampling protocol is described below.

**XRF Calibration** - XRF machines were calibrated at the beginning of each round of sampling using the stainless steel clip, as well as the EC681 standard. Both calibrations were done once with a test length of 60 seconds. Results were compared to known levels in the sample. During testing, a standardization was taken after every 200 readings, using both the stainless steel clip and the EC681 standard. In addition, one time standardization was performed with Wako Chemical USA ABS discs with cadmium, chromium, lead in high and low concentrations (NMIJ CRM 8106-a & NMIJ CRM 8105-a) and PVC disk standards (low and high concentrations). This can lead to an averaging of the chemicals of concern when near-surface materials are non-homogenous. This may lead to an underestimation of the level of chemicals of concern in a product.

**Testing** - Standard testing time was 30 seconds. The XRF machine was preset to test for the full 30 seconds. Only one test was taken per component/material of a product. An attempt was made to sample major components/materials of each product. Some toys were analyzed more or less than others based on the design of the product. Because the X-ray penetrates to 1/4 inch for plastics and other softer substrates, the measurement should be considered a surface or near surface measurement.

**Background Sampling** - Prior to the start of testing, a background sample was taken with the XRF analyzer. The same background was used for all samples. When backgrounds were used

they were free of all chemicals of concern.

**Machine Positioning** - When sampling, the XRF machine was held in a position perpendicular to the product being tested, without compressing the material. Tests were conducted on the flattest part of the product, and the entire analyzer window was covered by the material being tested, when possible. Products were not dismantled to test interiors.

**Levels of Detection (LODs)** – Up to 25 elements were analyzed in each sample. The Levels of Detection (LODs) for selected elements measured in the testing are as follows:

Element	Manufacturers Detection Limits (1)	Observed Detection Limits (30 second sample)(2)
Antimony	50-150 ppm	109 ppm
Arsenic	10-100 ppm	1 ppm
Bromine	10-100 ppm	2 ppm
Cadmium	50-150 ppm	61 ppm
Chlorine	1% - 5%	2.80%
Chromium	10-100 ppm	39 ppm
Cobalt	10-100 ppm	37 ppm
Copper	10-100 ppm	38 ppm
Lead	10-100 ppm	5 ppm
Mercury	10-100 ppm	7 ppm
Nickel	10-100 ppm	27 ppm
Tin	50-150 ppm	130 ppm

(1) InnovX Model ABC XRF Detector detection estimates based on 1-2 minute test times and detection confidence of 3-sigma, or 99.7% confidence. Detection limits are a function of testing time, sample matrix and presence of interfering elements.

(2) Observed detection limits varied by type of material being tested. Detection limits presented here are the lowest observed from all testing.

**Quality Assurance/Product Variation** - In order to evaluate the variation per product to assess and verify the accuracy of our testing, some repeat samples were taken. This process took place once every 200 samples, and was done for at least one product in every product category. Repeat samples are taken in three different ways:

1. Three readings taken from the same sampling location of one product.
2. Three readings taken from three different sampling locations (consisting of the same material, color, etc.) on the same product.
3. Three readings taken from the same sampling location on three different but identical products.

All repeat sample data was recorded and submitted for review.

**Data Interpretation** - The results were interpreted using the concentrations and deviations

reported by the analyzer, together with visual examination of the spectra generated by the instrument. The analyzer reports concentrations of elements by analyzing the spectra using reference data for the elements it reports, and measuring the area under the curve in the spectrum. We visually examined the spectra to confirm the presence of elements with known interferences (lead, bromine and arsenic) and have not reported them where we could not confirm presence. We report the highest level detected for each chemical of concern in the product as a whole (regardless of how many components the product has).

### **Methodological Limitations**

The levels of lead, cadmium, chlorine and other elements shown in this report are those reported by the XRF analyzer manufactured by Innov-X Systems, Inc. Our testing methodology uses standards with known levels of certain elements to check the accuracy of the analyzer in one type of matrix material. However, the products we tested are made of many different types of materials, in some cases even within the same product. The presence of materials may interfere with the analyzer's ability to quantify the elements accurately. When the materials in a single product are not homogeneous, the test results may vary depending on the orientation between the object under test and the testing device. Where the testing is not able to isolate a single material, the reported levels may represent an averaging of the levels in the different materials. Interferences can occur between elements as well, such as with lead and arsenic, resulting in poorer precision. Test results are reviewed for possible inference.

Therefore, the levels we report provide a general indication of the levels in the products in order to guide consumers on product choices. More exhaustive testing with the XRF, as well as laboratory testing, could provide more detailed findings on the levels of elements and associated compounds.

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