

# All Hands On Deck

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 ENVIRONMENTAL WORKING GROUP™

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# Summary

In February 2002 the U.S. Environmental Protection Agency (EPA) announced a phase out of the pesticide CCA, or chromated copper arsenate, an arsenic-based chemical mixture used to preserve so-called “pressure-treated” lumber. CCA is 22 percent arsenic by weight, and the Agency noted when it announced the ban that “arsenic is a known human carcinogen.” Children who play on arsenic-treated play structures and decks are at particularly high risk.

EPA's advice has misled millions of consumers about the safety of existing structures made with arsenic-treated wood.

Over 90 percent of all outdoor wooden structures in the United States are made with arsenic-treated lumber. Under the terms of the phase out, all of these structures will remain in place. Indeed, thousands more will be added to the human environment up until the final phase out date for the pesticide of January 2004. With literally millions of arsenic-treated decks, playsets, picnic tables and playgrounds in place across the country, several important questions remain unanswered: What level of risk do old arsenic-treated structures pose? And if the risk is similar to the new wood being banned, what should be done to protect people, particularly children, using structures made with this commonplace material?

According to the EPA there is no need to do anything. At the time of the phase out, ***EPA asserted that it “does not believe there is any reason to remove or replace arsenic-treated structures, including decks or playground equipment”*** (EPA, 2002).

But EPA had no science in hand on which to base this statement. Instead, EPA's advice is merely a policy judgment presented as scientific fact that has misled millions of consumers about the safety of existing structures made with arsenic-treated wood. The wood preserving industry claimed that old CCA-impregnated wood leaches minimal amounts of arsenic, but the EPA had no other evidence to support its view that older arsenic-treated structures were any safer than structures made from the new arsenic-treated lumber that it had just banned.

Data from an ongoing arsenic wood testing program show that older, arsenic-treated wood structures expose people to just as much arsenic as new structures.

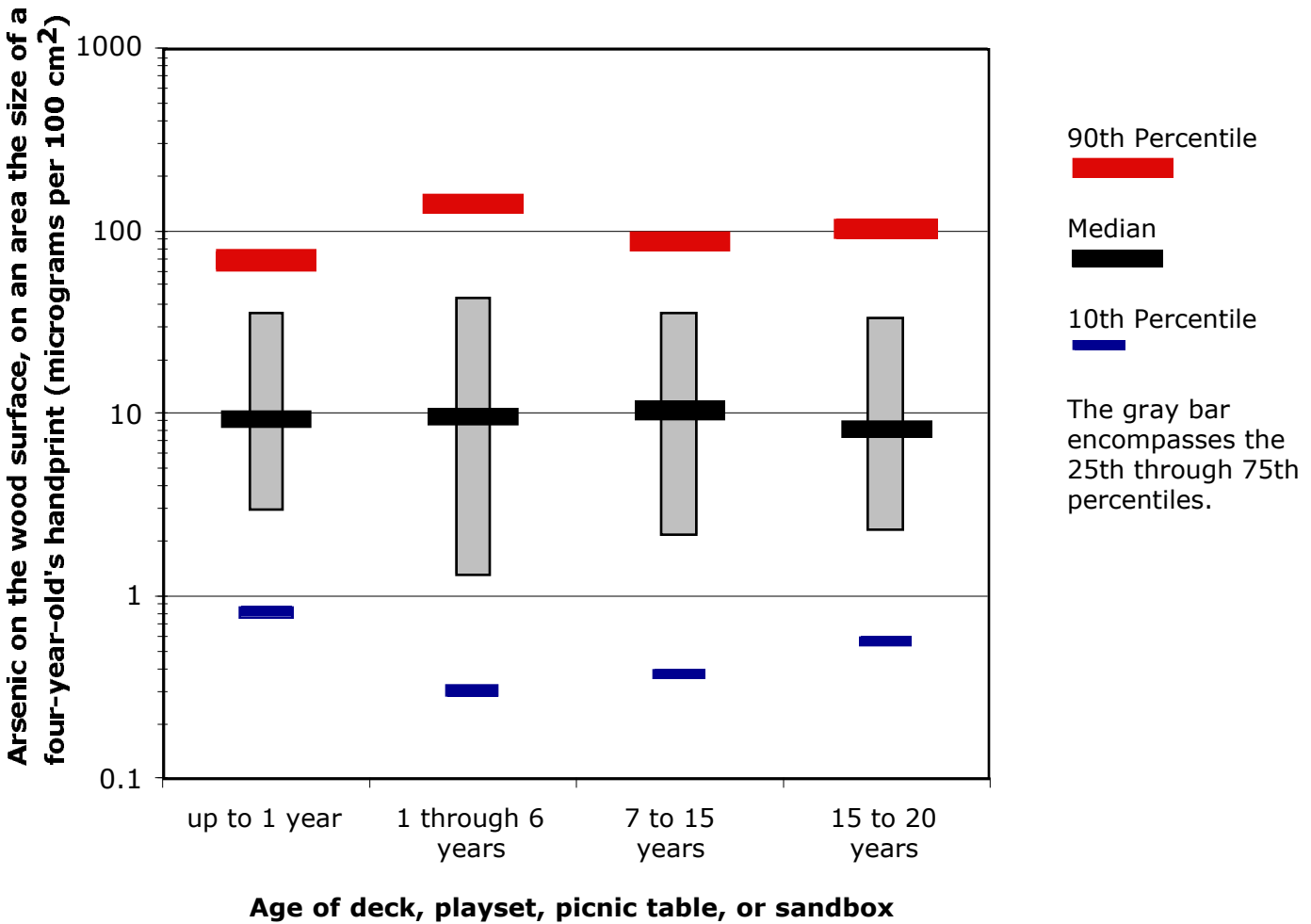
Even more importantly, EPA's advice is wrong. Data from an ongoing arsenic wood testing program – the largest of its kind ever conducted – show that older, arsenic-treated wood structures expose people to just as much arsenic as new structures.

# Findings

Arsenic levels on wood surfaces remain high for 20 years.

New test results from a home sampling program conducted by the Environmental Working Group (EWG) and the University of North Carolina-Asheville's Environmental Quality Institute (EQI) show that, contrary to the reassurances of the EPA, homeowners with old arsenic-treated decks, playsets, and picnic tables remain at risk from high levels of arsenic on old wood. In this testing program, the largest conducted in the 20 year history of arsenic-treated wood, 300 wipe tests from 263 decks, playsets, picnic tables, and sandboxes across 45 states show that arsenic levels on wood surfaces remain high for 20 years, the entire useful life of the wood.

**Figure 1. Old wood structures have just as much arsenic on the wood surface as do newer structures.**



Source: Environmental Working Group and UNC-Asheville Environmental Quality Institute Home Testing Program, 2001-2002



Among the findings of the home testing program are:

- Older structures have just as much arsenic on the wood surface, on average, as do newer structures (Figure 1). The average amount of arsenic that easily wipes off the surface of older structures (7 to 15 years old) is essentially the same as the arsenic on newer structures (up to one year old).
- Older structures are just as likely to have extremely elevated levels of arsenic on the surface (Figure 2) as are newer structures. Decks, playsets, and picnic tables at least seven years old are equally likely to have extremely high amounts of arsenic on the wood surface as are newer structures, with each group having an 11 percent chance of having more than 10 times what EPA allows in a liter of drinking water, on a 100 cm<sup>2</sup> area of wood. One of the most contaminated structures tested, an eight-year-old deck in Irvington, New York, had 25 times the amount of arsenic allowed in a liter of water, wiped from just a small patch of wood the size of a four-year-old's handprint (100 cm<sup>2</sup>).
- Commercial deck sealants provide no long-term reduction in arsenic levels on the surface of arsenic-treated wood.

Arsenic levels on wood sealed more than six months ago are statistically indistinguishable from levels on wood that has never been sealed.

Sealants appear to reduce arsenic levels for about six months, but surface arsenic levels on wood sealed more than six months ago are statistically indistinguishable from levels on wood that has never been sealed. Just after application, sealants begin to wear off through physical abrasion and weathering. The highest arsenic level measured from all 300 samples, 1053 micrograms on a 100 cm<sup>2</sup> wood surface, was found on a Houston, Texas deck sealed two years prior to testing.

- Even for decks that have been recently sealed, arsenic can be found at levels of concern. For example, three structures tested just two months after sealing had arsenic levels on an area the size of a four-year-old's hand that were two to three times more than allowed by the nation's tapwater safety laws in a six ounce glass of water. The same sized area tested on a backyard playset in O'Fallon, Missouri, sealed six months previously, produced 27 micrograms of arsenic, enough to contaminate 13 six-ounce glasses of water up to the maximum contamination level allowed by the EPA.

***The soil under arsenic-treated structures is heavily contaminated***

In its phase out announcement, EPA also reassured homeowners that the soil beneath arsenic-treated wood is not risky, despite

## **The home testing program**

Environmental Working Group initiated a home testing program with Health Building Network and UNC-Asheville's Environmental Quality Institute (EQI) last November to provide homeowners with information on the levels of arsenic on their wood structures, and practical ways to reduce arsenic exposures. The program has now become the largest ever arsenic-treated wood testing program in the 20 year history of the wood.

Hundreds of consumers have ordered test kits over the Internet, at [www.ewg.org](http://www.ewg.org). The kit provides options for sampling arsenic on the wood surface, in the soil below, or both. Soil from areas of the yard far from wood structures can

also be tested, which allows testers to compare the natural, low background levels of arsenic in soil to the elevated levels typically found in the soil beneath wood structures. The program operates at cost. The \$15 price for the kit does not cover EWG data analysis or research, which are foundation funded.

Test kits are compiled and sent to kit purchasers by the laboratory at EQI. Sampling instructions are included in the kits along with all the necessary sampling supplies. The sampling method for arsenic wipes was modified from standard lead dust wipe methods (e.g., American Society for Testing Materials method E1728) that are most commonly used to sample lead dust on windowsills. Versions of this method have been used to sample arsenic residue on wood by the Consumer Product Safety Commission (CPSC,

the fact that arsenic leaches out of the wood year after year to contaminate the soil below: “EPA is not recommending that existing structures or surrounding soil be removed or replaced” (EPA 2002). But new soil tests from 208 backyards or parks with arsenic-treated wood structures show that:

- In nearly two of five backyards and parks, the soil tested had enough arsenic to qualify as a Superfund site. Arsenic at these same levels in industrial areas would propel the site into state or federal hazardous waste cleanup programs, yet EPA is on record reassuring the public that these levels are safe for homeowners.

## Ten safety steps to reduce your family’s exposure to arsenic from arsenic-treated wood

Though prohibitively expensive for some families, replacing arsenic-treated wood structures with safer alternatives (wood with arsenic-free preservatives, cedar, or recycled plastic composite) is the best long-term solution to reducing risks. Short of that, here are simple steps you can take to reduce arsenic exposures:

1990), the California Department of Health Services (CDHS, 1987), Health and Welfare Canada (Riedel et al 1991), and the treated wood industry (Osmose, 1998).

To sample for arsenic on a wooden surface, testers first tape a plastic template with a 100 cm<sup>2</sup> precut opening onto the wood surface, then wipe arsenic from the wood within the plastic window using a pre-moistened laboratory wipe and wiping in an S-pattern shown in the instructions. Testers then seal the wipe in a plastic container included with the test kit, and mail it back to the laboratory.

The soil sampling method developed for the home test kit was based on standard EPA surface soil sampling protocol for Superfund sites. Testers use a clean garden tool to chop and mix a 6x6

inch area of soil 2 inches deep, beneath or downslope from an arsenic-treated wood structure. They then scoop a small amount of dirt into a plastic cup provided by the lab, seal the cup in a plastic bag, and mail the sample back to the lab.

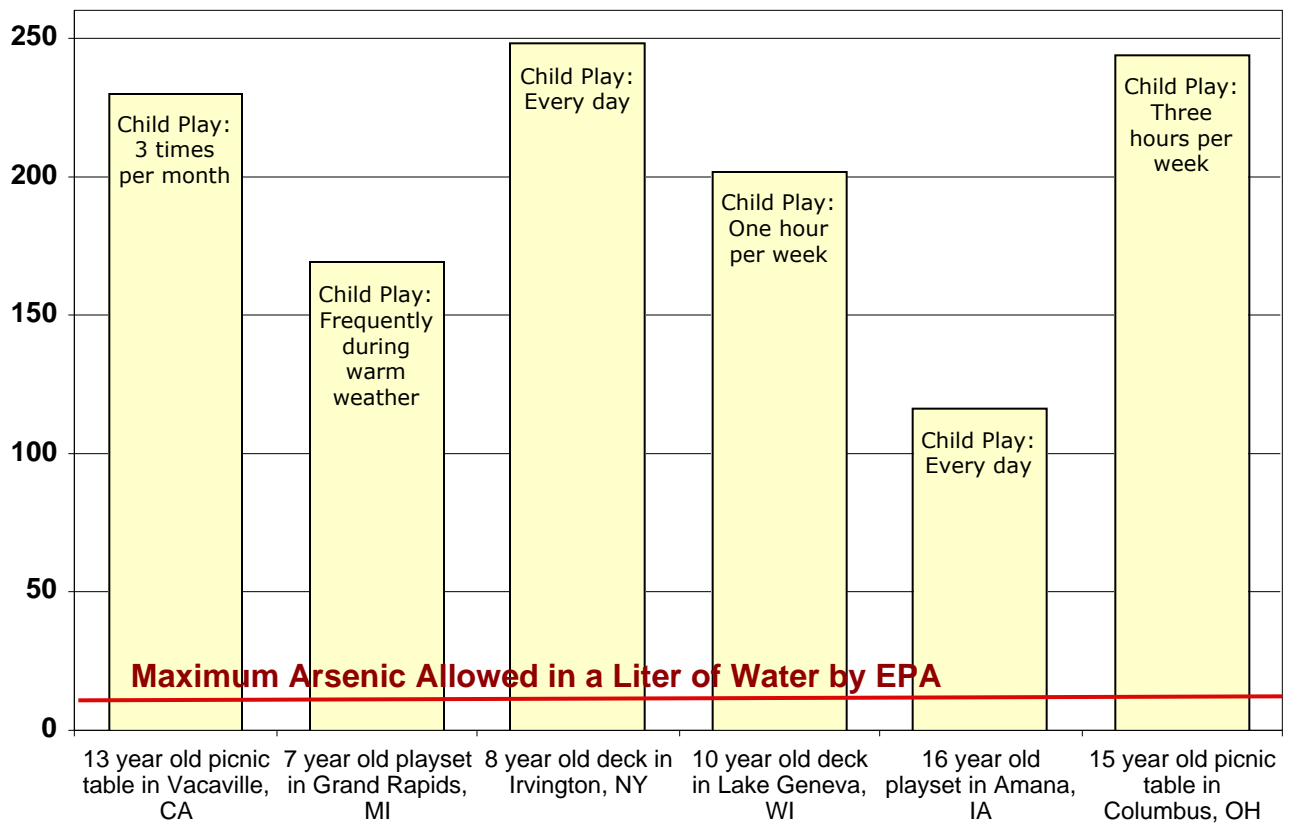
The EQI laboratory analyzes the samples according to Standard Method 3113B (APHA et al 2000) and sends results back to testers within about two weeks, with information that puts test results in context of what other samples have shown, then gives details on the cancer risks involved, and that tells testers what they can do to minimize their family’s arsenic exposures, including sealing the wood and washing hands each time after contacting the wood.

The testing program is ongoing.

1. Seal the wood at least every six months with standard penetrating deck treatments.
2. Replace sections of potential high exposure like handrails, steps, or deck boards with non-arsenic alternatives.
3. Wash your hands and your children's hands after every exposure to arsenic-treated wood, especially before eating.
4. Keep children and pets away from the soil beneath and immediately surrounding arsenic-treated wood structures.
5. Cover arsenic-treated picnic tables with a tablecloth before using.
6. Do not pressure wash to clean the surface of arsenic-treated wood. Instead use a soap and water solution, with

Arsenic on the wood surface, on an area the size of a four-year-old's handprint (micrograms per 100 cm<sup>2</sup>)

**Figure 2. Arsenic levels on surfaces of old wood structures far exceed the amount of arsenic EPA allows in drinking water.**



**Source: Environmental Working Group and UNC-Asheville Environmental Quality Institute Home Testing Program, 2001-2002**



disposable cleaning supplies. Pressurized water will blast off the upper surface of the wood and spray arsenic-contaminated particles over your yard.

7. Do not allow children to play on rough wood surfaces. Arsenic-treated wood splinters can be dangerous.

8. Never sand arsenic-treated lumber. If wood is smooth enough that splinters are not a risk, avoid sanding a deck to prepare the surface for sealing – use a simple soap and water wash instead. Wood dust formed by sanding contains arsenic that is easily ingested by a child, or can wash off the surface to contaminate the soil below.

9. Do not store toys or tools under the deck. Arsenic leaches from the wood when it rains and may coat things left there.

10. Do not use commercial “deck washing” solutions. These solutions can convert chemicals on the wood to a more toxic form.

## **How children are exposed to arsenic from decks, playsets, and picnic tables**

“Pressure-treated” lumber has been used to build nearly all outdoor wood structures over the last two decades. This wood is infused with a chemical called chromated copper arsenate, or CCA, a potent pesticide that is 22 percent arsenic. Arsenic is easily rubbed off the surface of the wood for the entire life of the structure. Arsenic also leaches from the wood to contaminate the soil below. It sticks to children’s hands when they play on the wood or in the soil. It is absorbed through skin into the body. And children put their fingers and hands in their mouths frequently and can ingest significant amounts of arsenic.

Multiple studies have shown that arsenic adheres to human skin that touches arsenic-treated wood. For instance, the Maine Department of Health washed 55 micrograms of arsenic off the left hand of a 20-month old child allowed to play freely on a three-year-old deck for less than 10 minutes (Maine DOH 1998). The test result was equivalent to the arsenic from five and a half liters of water, polluted up to the allowable federal level, being condensed onto that tiny hand. Study after study has supported the concern that each time a child puts her fingers in her mouth after touching arsenic-treated wood, she gets an extra dose of arsenic.

**Multiple studies have shown that arsenic adheres to human skin that touches arsenic-treated wood.**

Touching arsenic-treated wood translates into exposures that for many children can be far above the Agency's normal threshold for an allowable cancer risk.

Arsenic is on EPA's very short list of chemicals known without a doubt to cause cancer in humans – lung, bladder, and skin cancer, for example. Pressure from the public and EPA forced the wood industry to announce a phase out of arsenic-treated wood last February (EPA 2002). Under the terms of the agreement, the wood will no longer be available in home improvement stores beginning January 1, 2004.

### **Arsenic residues on the wood surface remain high over the life of the wood**

Despite EPA's contention that it fails to see "any reason to remove or replace CCA-treated structures, including decks or playground equipment," it is becoming increasingly apparent that the act of touching arsenic-treated wood translates into exposures that for many children can be far above the Agency's normal threshold for an allowable cancer risk.

Older structures are just as likely to have extremely elevated levels of arsenic on the surface as newer structures.

The data analyzed for this report include wipe tests conducted by 208 people in 41 states, and encompass 300 wipe samples from 263 wood structures, including 112 decks, 135 playsets, 14 picnic tables, and 2 wooden sandboxes. Analysis of these data show that old structures have just as much arsenic on the wood surface, on average, as do newer structures (Figure 1). The average amount of arsenic that easily wipes off the surface of older structures (7 to 15 years old) is essentially the same as the arsenic on newer structures (up to one year old).

And older structures are just as likely to have extremely elevated levels of arsenic on the surface as newer structures (Figure 2). Decks, playsets, and picnic tables at least seven years old are equally likely to have extremely high amounts of arsenic on the wood surface as are newer structures, with each group having an 11 percent chance of having more than 10 times what EPA allows in a liter of drinking water, on a 100 cm<sup>2</sup> area of wood. Among the older structures with high arsenic residues was a 16-year-old playset in Amana, Iowa, for which the tester wiped 116 micrograms of arsenic from a 100 cm<sup>2</sup> surface.

A woman from Columbus, Ohio wiped 244 micrograms of arsenic, or 24 times what EPA allows in a liter of drinking water, off the surface of a picnic table at a public playground – and this was the arsenic on just a small patch of the tabletop the size of a four-year-old's handprint (100 cm<sup>2</sup>). If a child laid a sandwich, for example, or a piece of fruit or lunchmeat down on this table, hundreds of micrograms of arsenic could adhere to the surface of the food and then go directly into the child's mouth.

A comparison of the arsenic found on decks and playsets to EPA's

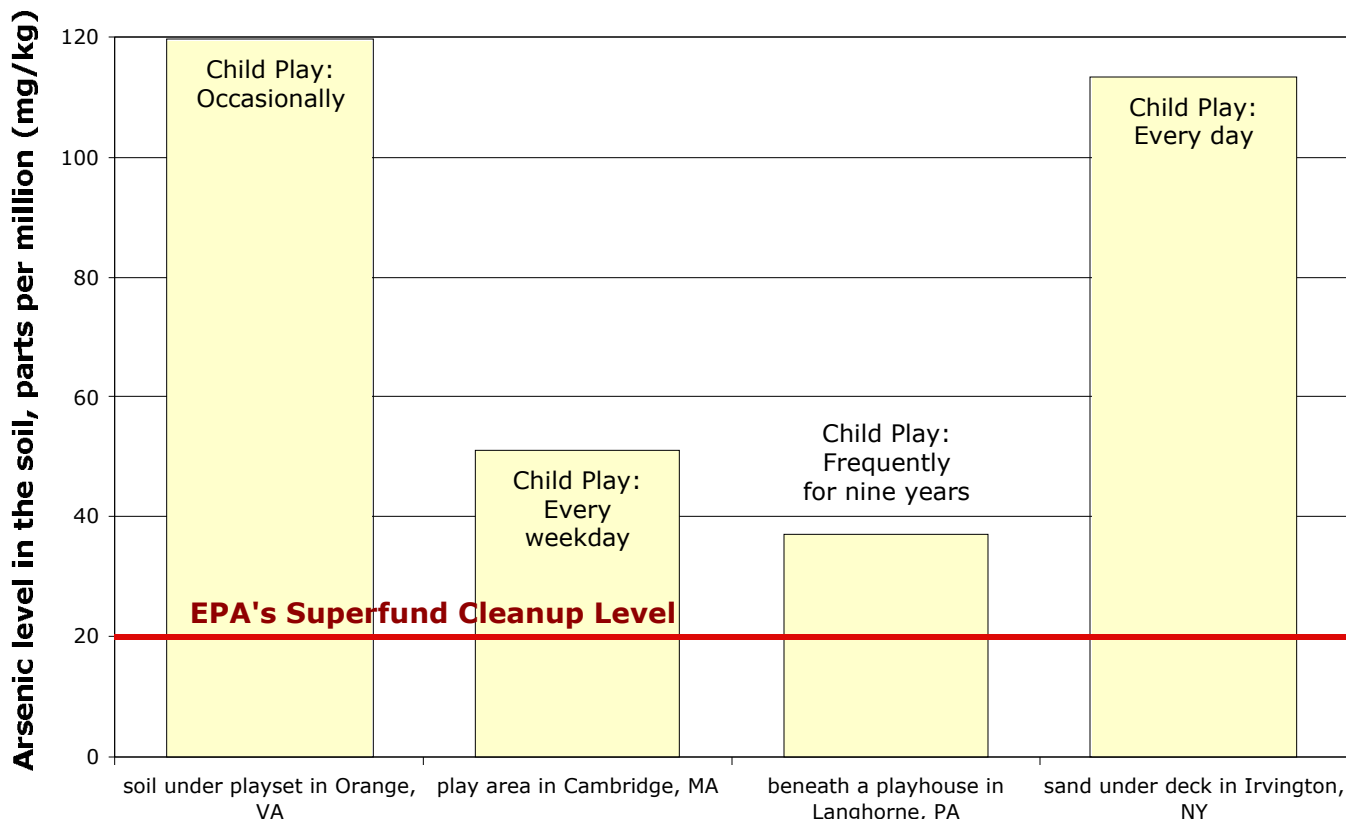
allowable daily dose of arsenic in drinking water shows that for many children, exposures to arsenic from treated wood can easily dwarf exposures from contaminated drinking water. EPA's allowable daily dose of arsenic in drinking water, 10 micrograms, was not promulgated based strictly on public health considerations, but was driven by practical and political constraints in a drawn-out and much-publicized process. The National Academy of Sciences review confirms that an exposure level of 10 micrograms per day is not a safe threshold, but is in fact associated with a substantial cancer risk where one in 300 people would be expected to develop cancer (NRC, 2001).

During each rainfall, arsenic is washed from the surface of decks, picnic tables, and playsets onto the soil below.

### Arsenic-treated wood turns backyards into potential Superfund sites

During each rainfall, arsenic is washed from the surface of decks, picnic tables and playsets onto the soil below. Although EPA has reassured homeowners that the soil beneath arsenic-treated wood is not risky ("EPA is not recommending that... soil be

**Figure 3. Children routinely play in soil so contaminated with arsenic that it would qualify their backyard as a Superfund site.**



Source: Environmental Working Group and UNC-Asheville Environmental Quality Institute Home Testing Program, 2001-2002

removed or replaced,” states their phase out announcement), the test results from this program show that nearly 40 percent of these backyards tested have enough arsenic in the soil to qualify as Superfund sites. These same levels of arsenic in industrial areas could propel the site into a state or federal cleanup program, yet EPA is on record reassuring the public that these same levels are safe for families.

This study provides data on arsenic-contaminated soil samples from 97 testers in 31 states, and encompass 121 samples near 109 structures, including 42 decks, 73 playsets, and six sandboxes. All told, soil from 40 percent of the backyards and parks tested exceeded EPA’s recommended Superfund cleanup level of 20 parts per million (ppm), and soil from 17 percent of the sites doubled the cleanup level. For 7 samples, arsenic levels exceeded 100 ppm, or five times EPA’s Superfund level (Table 1, Figure 3).

The two highest soil arsenic concentrations in the study come from arsenic structures on opposite ends of the age spectrum. One tester found 190 ppm of arsenic in soil beneath a nine-month-old deck in Brooklyn, New York where her child plays twice a day– a high contamination level possibly related to sawdust from construction coating the ground below – and a tester from Hinsdale, Illinois who found 192 ppm of arsenic in soil beneath a 15-year-old deck where his child plays three times a week.

Generally, arsenic adheres to clay particles, and so is more likely to build up to high levels in clayey soil than in sands, where it would be expected to move with percolating rainwater into deeper soil zones. The data from this home testing program generally bears this out, with a few exceptions. For example, the arsenic level in sand under a deck in Irvington, New York was more than five times the Superfund cleanup level (113.3 ppm). Arsenic in sand from a sandbox in Newton, Massachusetts set beneath an arsenic-treated playset was more than 50 percent higher than EPA’s Superfund cleanup level (32.4 ppm). Sandy soil in a garden surrounded by arsenic-treated lumber in Aruada, Colorado was contaminated with arsenic at a level of 45.3 ppm..

Many people have been acutely poisoned by arsenic-treated wood, sustaining lifelong, debilitating injury.

### **Human poisonings from arsenic-treated wood**

Many people have been acutely poisoned by arsenic-treated wood, sustaining lifelong, debilitating injury.

In 1999 the FBI suspected foul play when a Mississippi woman, hospitalized for severe vomiting and diarrhea, was found to have

levels of arsenic in her body 100 times higher than normal. They began investigating her husband as a suspect for deliberate poisoning, and local police advised the woman, a 50-year-old computer programmer, to leave her husband – or at least to cook her own food. Only when tests of the man’s hair showed even higher levels of arsenic did the FBI begin piecing together the real story, as they finally connected the woman’s symptoms and the couple’s arsenic levels to the fact that the two had been building a cabin outside of Memphis using arsenic-treated wood for the frame. She had been poisoned by the wood, not by her husband.

After three weeks of sawing what he had been told was “salt-treated” wood to make picnic tables, a Forest Service employee in Bloomington, Indiana suddenly vomited seven to eight units of bright red blood in the bathroom of his home. He passed out, was driven to the hospital by his wife, and was eventually prescribed a mild diet by doctors who failed to connect the bleeding to the wood. One year later he was again assigned to saw wood for picnic tables, and after three weeks he again vomited bright red blood, three to four units worth. This time he suspected that something in the wood was causing the bleeding. When his wife called his boss with the question “What’s in this wood?” they finally learned it contains arsenic. Three months after this second bleeding episode, testing showed arsenic levels in his hair and urine hundreds of times higher than normal. A jury found Osmose Wood Preserving Company of America liable

**Table 1. Two of every five yards or parks tested have soil contaminated with arsenic at Superfund levels.**

<b>Percent of backyards or parks tested</b>	<b>Soil arsenic level exceeds EPA's Superfund cleanup level of 20 parts per million (ppm) by this amount...</b>
<b>38%</b>	At least Superfund level of arsenic contamination
<b>17%</b>	At least 2 times Superfund level
<b>11%</b>	At least 3 times Superfund level
<b>7%</b>	At least 4 times Superfund level
<b>6%</b>	At least 5 times Superfund level

**Source: Environmental Working Group and UNC-Asheville Environmental Quality Institute Home Testing Program, 2001-2002**

under the theory of product liability. The man received more than \$700,000, but remains totally disabled, fighting chronic pain (McCrea, undated).

Other acute poisoning cases on record include:

- In 1978, workers who were building a pier in Monterey, California developed arsenic poisoning from working with arsenic-treated wood (CADHS 1987).
- A Washington State schoolteacher was partially paralyzed from arsenic poisoning after building a swimming dock made of arsenic-treated wood. He settled with the wood manufacturers, but he continues to suffer permanent, partial paralysis in his face and other sustained effects (Hauserman, 2001).
- A family in Wisconsin suffered serious illnesses, including seizures, after burning treated wood scraps repeatedly in their wood stove (Peters, 1984).
- Just last June a Denver, Colorado couple sued Home Depot when they experienced arsenic poisoning symptoms after building a deck with arsenic-treated wood (Vara, 2002).

All told, about 30 individual lawsuits have been filed nationwide, involving claims on health effects from sawdust, splinters, and inhalation. Every time one of these cases has been presented to a jury, the plaintiff has prevailed (Liptak, 2002).

### **Sealing works, but not for long**

Wood sealed more than six months ago is statistically indistinguishable from wood that has never been sealed.

To further compound the public's confusion on what to do with existing arsenic structures, in its phase out announcement EPA makes an equivocal recommendation for sealing wood structures: "[S]ome studies suggest that applying certain penetrating coatings (e.g., oil-based semi-transparent stains) on a regular basis (one re-application per year or every other year depending upon wear and weathering) may reduce the migration of wood preservative chemicals from CCA-treated wood" (EPA 2002).

So does sealing really work to reduce arsenic exposures? The available data show that sealing can reduce arsenic levels on the surface of the wood, **but only for a period of months.**

Short-term declines in arsenic residues after sealing are supported by two studies in which researchers measured arsenic levels on wood before and after sealing. In one of these studies, the

California Department of Health Services (DHS) found reduced arsenic residues on a public playset in Berkeley six months after sealing (they applied a stain), but not two years after, which was the next time they tested (CDHS, 1987). In the second study, also conducted by California DHS, researchers found undetectable levels of arsenic immediately after sealing, but elevated levels again two years later.

An analysis of results from our testing program show that sealing is effective for a period of only months. In fact, we found that wood sealed more than six months ago is statistically indistinguishable from wood that has never been sealed. A standard statistical test called the Mann-Whitney non-parametric test shows that the 103 structures sealed more than six months ago are statistically indistinguishable from the 112 wood structures in our program that, according to information submitted by the testers, had never been treated or sealed, at a 95 percent confidence level. The fifth highest arsenic level of the 300 available tests was found on a backyard playset in Livermore, California sealed just one year ago.

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And even these reduced levels of arsenic are not safe for children. The residual risks are compounded by the fact that the process of sealing itself can greatly enhance risks over the short-term, through preparation processes like pressure washing and sanding, which are used routinely by contractors and do-it-yourselfers to prepare the wood.

The award-winning home improvement site [www.household-helper.com](http://www.household-helper.com) recommends pressure washing unequivocally: "A good power wash will deep clean even the nastiest wood... Pressure washing will actually wear away the top layer of wood to reveal its original look." This recommendation is followed by advice to sand: "Small splinters will most likely remain on some sections of wood when you're done, so be prepared to do some touch-up sanding on the softer boards." These two processes in combination can mobilize much more arsenic than would otherwise be available to adhere to a child's skin. Pressurized water will blast off the upper surface of the wood and spray arsenic-contaminated particles over the surrounding yard. Sanding creates arsenic-contaminated sawdust that can be ingested by a child or that can wash off the wood to contaminate the soil below.

The potential hazards of sanding are clear to the parents of six-year-old Emily Janak from Town of Boston, New York. Last October the Janaks sanded their backyard deck while their daughter played nearby, near enough to breathe in some of the sawdust, her mother believes. Unaware the dust was contaminated with arsenic, the Janaks continued afterwards to allow Emily

to play on the deck, which had always functioned as her outdoor playpen. A month later the Janaks noticed that Emily's fingers were peculiarly curled up, and she could no longer properly grip a ball. Although Emily has Down syndrome, these problems were not part of her condition. Her mother suspected lead or mercury, but a full suite of metals testing instead showed arsenic levels four times higher than normal in Emily's body.

Considering the magnitude of the risks involved with arsenic-treated wood, and the sheer number of documented poisonings, EPA's failure to provide the public with sound advice on old decks and playsets indicates that the Agency may be putting the interests of the wood industry to minimize liability over concerns for public health. EPA should instead act promptly to provide comprehensive advice to the public on ways to minimize exposures to arsenic from existing wood structures.

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