

LATE LESSONS FROM PRESSURE-TREATED WOOD - Pt. 1

by Sandra Steingraber, Ph.D.*

Within the European Union, the European Environment Agency (EEA) is charged with providing information for environmental decision-making, especially in situations where the science is uncertain. Three years ago, this agency published a remarkable book, *Late Lessons from Early Warnings: The Precautionary Principle 1896-2000*.^[1]

This report explores how scientific knowledge about possible environmental health threats is gathered and used to make public decisions. Organized around twelve case studies -- ranging from radiation to mad cow disease -- the various chapters benefit from hindsight as they examine the ways in which the first warnings about these now-known hazards were sometimes wisely heeded but more often foolishly ignored, cynically scorned, or researched for decades until the evidence for harm became so egregious that something had to be done. In some cases, the actions finally taken to redress the problem were so late in coming that "pipelines of unstoppable consequences" were already set in place.

The earliest warnings on the dangers of asbestos, for example, came from a British factory inspector, Lucy Deane, who, in 1898, correctly documented the "evil" effects of inhaling its tiny, glass-like fibers. One hundred years later, the United Kingdom finally banned white asbestos. The current death rate in England from asbestos-related disease is 3,000 people per year.^[2] An early warning unheeded.

Last month in Brussels, I had the privilege of hearing David Gee, the report's principle author, address the European Parliament. Why, he asked, do so many environmental health disasters fall victim to wait-and-see attitudes? What lessons can be brought from the past to the problems of the present? In an upcoming issue of *Rachel's Environment & Health News*, we will look more closely at the warnings and lessons in Gee's report (which is soon to be re-released with additional case studies ^[3]) and how it is inspiring the implementation of the precautionary principle in Europe.

Here, we apply Gee's historical approach to an environmental health problem that continues to haunt back yards and playgrounds throughout the United States: pressure-treated wood.

The name itself is a euphemism. What pressure-treated wood is actually treated with is a mixture of pesticides called chromated copper arsenate (CCA). Pressure-treated lumber is made by placing a freshly milled board inside a vacuum chamber and sucking from its fibers all water and air. Then, under high pressure, copper, chromium, and arsenic are forced into the now empty cells.^[4] Pressure treatment is to wood what embalming is to humans.

As of January 1, 2004, after seventy years of production, the manufacture of pressure-treated (CCA) wood for residential use has ended in the United States.^[5] It turns out that

the arsenic in pressure-treated wood rubs off on the hands of those who touch it. When those who touch it are children, their risk of developing lung and bladder cancer are significantly raised.[6] Young children at play put their hands in their mouth an average of 16 times an hour[7]. CCA is 22 percent pure arsenic by weight. Arsenic is a known human carcinogen.[8]

A recall of all the swing sets, picnic tables, decks, and fences already constructed from this lumber is, however, not part of the decision to cancel the registration of CCA. And with 90 percent of all outdoor wooden structures in the United States made of pressure-treated wood, each with an expected life span of twenty years or more, a "pipeline of unstoppable consequences" may, even now, be well under construction. Weathered lumber leaches as much -- or more -- arsenic than newly milled boards.[10] Arsenic, like all metals, is absolutely persistent in the environment. It does not biodegrade. It does not go away.

Pressure-treated wood is a case study not included in the EEA's "Late Lessons" report -- but it could be.

The story begins in 1933 when an Indian engineer, Sonti Kamesam, made a discovery that saved the lives of countless coal miners: injected into wood, arsenic and copper prevent timber beams from rotting. Arsenic, a time-honored poison, kills wood-eating insects. Copper kills fungus. Kamesam's special trick was to add chromium to his formula, thereby binding the two toxic metals to the wood fibers.[11] The result was stronger roofs in the damp underground tunnels through which coal is extracted. One can imagine that the last thing a coal miner wants to see in the beams above his head is dry rot or termites.

Kamesam's invention not only extended the life expectancy of miners in India, it saved money and trees. His work quickly attracted attention in the United States. A patent was granted in 1938.[12] Meanwhile, researchers in Mississippi pounded wooden stakes treated with copper chromium arsenate (CCA) into fields that swarmed with termites. Months later, they were still standing. In 1950, a highly impressed Bell Telephone applied for permission to use CCA wood for telephone poles.[13] At this time, arsenic was known to be an acute poison, but its ability to cause cancer at low doses was not generally understood.

For the next two decades, CCA wood remained a specialty product. Porches, fences, docks, and boardwalks continued to be constructed out of tree species that are naturally rot-resistant, such as cedar, redwood, cypress, or fir. When the structures from these woods finally collapsed -- or some unlucky soul fell through the floorboards -- they were simply rebuilt. Then, in the 1970s, the price of wood soared. Cheap, plantation-grown southern pine became the homeowner's construction material of choice.[14] And it could be made to repel insects and dry rot with a pesticidal formulation originally intended to prevent mines from caving in.

Early concerns about pressure-treated wood surfaced during the 1970s as pressure-treated

wood found its way into picnic tables, gazebos, landscaping timbers, and California-style decks on the backs of suburban homes.[15] No one eats, barbecues, or sunbathes on the pesticide-soaked rafters of mine tunnels, but the back yard deck was specifically designed with such activities in mind. Even more ominous was the growing use of pressure-treated wood in children's playgrounds. Wooden, castle-style play structures, complete with towers and swaying suspension bridges, became the rage. In 1978, the U.S. Environmental Protection Agency began a special review.

Ten years and many delays later, the EPA decided to reregister CCA as a pesticide without restrictions on the use of the treated wood -- in spite of the fact that CCA exceeded the agency's risk criteria for carcinogenicity, and all other uses for arsenical pesticides were canceled.[16] At this point, almost no one in the general public was aware that pressure-treated wood contained pesticides. Nor that those sawing or sanding the wood should wear goggles and gloves. Nor that work clothing that comes in contact with the wood should be washed separately. Nor that food should never touch it.

The EPA did recommend that pressure-treated wood sold directly to consumers via lumber yards and home improvement centers bear warning labels. The timber industry balked, proposing instead that retail stores should distribute fact sheets to educate buyers about the wood's potential hazards. The government agreed. Few retailers complied with this decision. The government did little to enforce it.[17]

Warnings continued to trickle in throughout the 1980s. Workers in wood treatment plants were found to have elevated levels of arsenic in their urine. A government employee became completely disabled after building picnic tables in an unventilated shop. Eight members of a rural Wisconsin family fell ill with a mysterious neurological disease that turned out to be arsenic poisoning caused by burning pressure-treated lumber in the wood stove.[18]

In 1990, the Consumer Product Safety Commission released the results of its investigation into children's exposure to CCA from playing on pressure-treated wood playground equipment. The study did conclude that contact with such play structures increases children's exposure to arsenic, but the only health endpoint considered was skin cancer and the risks were considered insufficient for a ban.[19]

Then, in the 1990s, the scientific case against pressure-treated wood became more damning. The National Research Council reported that arsenic exposure through drinking water was linked to lung and bladder cancers and could exert its carcinogenic powers at much lower levels of exposure than previously believed. Children, whose livers metabolize arsenic more slowly, were shown to be at particular risk.[20] Other discoveries followed: at very low levels, arsenic interferes with a family of hormones called glucocorticoids, possibly raising the risk for diabetes.[21]

Meanwhile, in 1996, far from the lab bench, a Connecticut chemist, David Stilwell, began crawling around back yard decks throughout New England. A year later, he reported that the soil under and around pressure-treated structures contained concentrations of arsenic

far in excess of background levels, and in some cases, far in excess of the clean-up standards for Superfund sites. More than sixty years after Kamesam's humanitarian invention, Stilwell discovered that chromium does not serve as such an effective binding agent after all. Eventually, the arsenic and copper leach out. Especially if the wood is rained on.[22]

Still other researchers began to consider if inhalation of arsenic-contaminated dust -- as when children play in the dirt beneath decks and play structures -- might be a route of exposure as significant as ingestion by hand-to-mouth transfer.[23]

In light of these discoveries, two environmental organizations, Environmental Working Group (EWG) and Healthy Building Network (HBN), teamed up to conduct their own investigation. Analyzing data from 180 different wood samples, these researchers concluded that playing on pressure-treated wood is a greater source of arsenic exposure for children than drinking arsenic-contaminated drinking water.[24] (At the time this report was released, spring 2001, the Bush administration had just delayed the implementation of new, tighter drinking water standards for arsenic -- to the outrage of many.) EWG and HBN then petitioned the Consumer Product Safety Commission for an immediate ban on the use of CCA wood in play equipment and a recall on existing structures.[25] The Commission responded by launching a new risk assessment. As did the EPA.

Also in spring 2001, an investigative journalist in Florida, Julie Hauserman of the St. Petersburg Times, wrote a Sunday story, "The Poison in Your Backyard," that brought the issue to the public at last.[26] The result of months of investigation, Hauserman collected soil beneath playgrounds in a five-county area and sent it to labs for testing. Working closely with scientists at the University of Florida and the University of Miami, she also looked at what happens to the arsenic in pressure-treated wood dumped in landfills -- an issue that took on new urgency in the aftermath of Hurricane Andrew, when tons of demolition materials were added to the waste stream.

"Arsenic," Hauserman wrote, "is leaking out of huge wooden playgrounds that volunteers built all over Tampa Bay. It's leaking beneath decks and state park boardwalks, at levels that are dozens of times -- even hundreds of times -- higher than the state considers safe. And discarded pressure-treated lumber is leaking arsenic out of unlined landfills... posing a threat to drinking water."

The spring 2001 publication of Hauserman's investigation was a cultural tipping point. Time magazine, the New York Times, and the Los Angeles Times all followed up with investigative stories of their own, as did local television stations throughout the country. Bills were introduced in Congress and in the Florida legislature; class actions suits were filed.[29]

Many parents, school boards, and parks superintendents did not wait for the outcome of these legal initiatives. Day care centers ripped out play structures. Arsenic-contaminated playgrounds closed throughout Florida and around the nation -- including some in

Rochester, New York, where citizen activists had been unsuccessfully pushing for their closure since 1990.[28] In May 2001, the city council of Cambridge, Massachusetts passed a resolution to "replace all existing City playground and park equipment constructed with CCA-treated wood with arsenic-free alternatives on an expedited, specific time table." [29]

The following fall, EWG and HBN released a new report about arsenic levels in lumber purchased at Lowe's and Home Depot. Shoppers were sent into retail outlets in 13 states to purchase pressure-treated lumber. (Note: not a single buyer was offered the safety warnings required by law.) Arsenic was easily wiped off the surface of all purchased wood -- at levels up to 1,000 micrograms per 100 square centimeters, which is about the size of a four-year-old's handprint. This was considerably more arsenic than the EPA's allowable exposure level for arsenic in drinking water.[30]

Good investigative journalism, combined with the advocacy work of EWG and HBN, had a powerful effect. Catapulting the issue of pressure-treated wood further up the chain of command was blue-chip science. In September 2001, the National Academy of Sciences announced, based on new findings from Chile and Taiwan, that the cancer risks from arsenic in drinking water were even greater than estimated in their ground-breaking 1999 report.[31] The EPA now had little choice about adopting the stricter drinking water standards that it had been quietly trying to back away from. And the dangers of arsenic were in the news again.

In February 2002, the EPA announced that it had reached an agreement with the timber industry: CCA production would be phased out over a 22-month period.[32] This delay was to allow wood treatment facilities to convert to alternative chemicals, such as ACQ, a copper-based preservative. (Arsenic-free ACQ wood has been available in Europe for many years. Because it contains more copper, it is more expensive than CCA.) As of January 1, 2004, CCA would no longer be registered for use to treat wood intended for residential settings. While stores would still legally be allowed to sell left-over stock after the New Year's Eve deadline, the vice president of merchandizing for Home Depot pledged in the pages of the Washington Post that the process of phasing in alternatives to CCA wood "will be complete by December 31." [33]

It was not. At this writing, the shelves of many home improvement stores are still full of CCA lumber for sale to unsuspecting buyers. The ban is still on the books -- but not in the stores, many of which have enough stock to last for months to come.[34] Moreover, there is still no plan to remediate all the structures already built from CCA wood. What happened?

[To be continued.]

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The following web sites are all excellent sources of information on CCA wood and provide access to many key documents and reports:

<http://www.ccaresearch.org> <http://www.bancca.org> <http://www.nocowood.ca>
<http://www.beyondpesticides.org> <http://www.healthybuilding.net>

[1] European Environment Agency, Late Lessons from Early Warnings: The Precautionary Principle 1896-2000 (Luxembourg: Office for Official Publications of the European Communities, 2001) Available at <http://www.rachel.org/library/getfile.cfm?ID=301>

[2] Late Lessons, p. 11.

[3] David Gee, personal communication (david.gee@eec.eu.int).

[4] C. Cox, "Chromated Copper Arsenate," *Journal of Pesticide Reform* Vol. 11 (1991), pgs. 2-6.

[5] U.S. Environmental Protection Agency, "Cancellation of Residential Uses of CCA-Treated Wood: Questions and Answers," (20 March 2003; <http://www.epa.gov/pesticides/factsheets/chemicals/1file.htm>)

[6] U.S. Environmental Protection Agency, A Probabilistic Risk Assessment for Children Who Contact CCA-Treated Playsets and Decks (13 Nov. 2003; <http://www.epa.gov/scipoly/sap>)

[7] N. Tolve and others, "Frequency of Mouthing Behavior in Young Children," *Journal of Exposure Analysis and Environmental Epidemiology* Vol. 12 (2002), pgs. 259-64.

[8] U.S. Agency for Toxic Substances and Disease Registry, "ToxFAQs for Arsenic," 2001; <http://www.atsdr.cdc.gov/tfacts2html>

[9] D.A. Belluck and others, "Widespread Arsenic Contamination of Soils in Residential Areas and Public Spaces: An Emerging Regulatory or Medical Crisis?" *International Journal of Toxicology* Vol. 22 (2003), pgs. 109-128.

[10] Evidence is reviewed in Belluck (see note 9 above.)

[11] P.A. Cooper, "Future of Wood Preservation in Canada: Disposal Issues," paper presented at the 20th Annual Canadian Wood Preservation Association Conference, Vancouver, BC (http://www.forestry.utoronto.ca/treated_wood/future.pdf)

[12] I. Lerner, "Potential Litigation Creates Concern for Wood Preservatives," *Chemical*

Market Reporter, 14 Oct. 2002, p. 14 (<http://www.chemicalmarketreporter.com>).

[13] D. Hopey, "Wood Treatment Linked to Dangers," Pittsburgh Post-Gazette 25 Jan. 1998. (Available on <http://www.bancca.org>.)

[14] C. Rist, "Arsenic and Old Wood," This Old House, Mar. 1998, pp. 118-25.

[15] Belluck (cited above in note 9). (See also historical timeline provided on <http://www.bancca.org>.)

[16] This history is described in Cox, 1991 (see note 4, above). See also G. Kidd, "CCA-Treated Lumber Poses Danger from Arsenic and Chromium, Pesticides and You Vol. 21 (2001), pgs. 13-15. (Available on <http://www.beyondpesticides.org>.)

[17] J. Hauserman, "Treated Wood Industry Fights Back," St. Petersburg Times, 2 July 2001; http://www.sptimes.com/News/070201/Treated_wood_industry.shtml

[18] W. Takahashi and others, "Urinary Arsenic, Chromium, and Copper Levels in Workers Exposed to Arsenic-Based Wood Preservatives," Archives of Environmental Health Vol. 38 (1983), pgs. 209-14; Cox, 1991 (cited in note 4, above); H.A. Peters and others, "Seasonal Arsenic Exposure from Burning Chromium-Copper-Arsenate Treated Wood," Journal of the American Medical Association Vol. 251 (1984), pgs. 2393-96.

[19] U.S. Consumer Product Safety Commission, Estimate of Risk of Skin Cancer from Dislodgeable Arsenic on Pressure-Treated Wood Playground Equipment (Washington, D.C., 1990).

[20] National Research Council, Arsenic in Drinking Water (Washington, D.C.: National Academy of Sciences, 1999).

[21] R.C. Kaltreider et al, "Arsenic Alters the Function of Glucocorticoid Receptor as a Transcription Factor," Environmental Health Perspectives Vol. 109 (2001), pgs. 245-51.

[22] D. Stilwell and K.D. Gorney, "Contamination of Soil with Copper, Chromium, and Arsenic Under Decks Built from Pressure-treated Wood," Bulletin of Environmental Contamination and Toxicology Vol. 67 (1997), pgs. 303-08.

[23] Belluck (cited above in note 9).

[24] Environmental Working Group and Healthy Building Network, Poisoned Playgrounds: Arsenic in Pressure-Treated Wood (Washington D.C.: May 2001; <http://www.ewg.org/reports/poisonedplaygrounds>)

[25] Environmental Working Group and Healthy Building Network, "Petition to the United States Consumer Product Safety Commission to Ban Arsenic-Treated Wood in Playground Equipment and Review the Safety of Arsenic-Treated Wood for General

Use," May 22, 2001 (<http://www.ewg.org/reports/poisonedplaygrounds/petition.pdf>).

[26] J. Hauserman, "The Poison in Your Backyard," St. Petersburg Times, 11 March 2001. (<http://www.sptimes.com/News/webspecials/arsenic>)

[27] M. Dunne, interview with Julie Hauserman in SEJournal, Society of Environmental Journalists, Winter, 2001, p. 1.

[28] Contact Rochesterians Against the Misuse of Pesticides for this fascinating history: Judy Braiman, 716-383-1317.

[29] Cambridge (Mass.) City Council meeting, 7 May 2001.

[30] Environmental Working Group and Healthy Building Network, The Poisonwood Rivals (Washington, D.C.: Nov. 2001; <http://www.ewg.org/reports/poisonwoodrivals/>)

[31] National Research Council, Arsenic in Drinking Water: 2001 Update (Washington, D.C.: National Academy of Sciences, 2001).

[32] U.S. EPA, 2003 (cited above in note 5).

[33] J.M. Lerner, "New Rules on Treated Wood to Change the Backyard World," Washington Post, Sept. 6, 2003, p. G2.

[34] G.C. Bruno, "Confusing Phaseout," Gainesville Sun, Jan. 24, 2004.