Pressure-treated wood is a mainstay in the building industry. But a chemical leaching from the wood could prove hazardous to the environment and, in turn, our health. Engineering professor and alumna Helena Solo-Gabriele is conducting research to gauge the contaminant’s presence and deleterious effects in the environment while ensuring that it does not go unnoticed.

Out of the Woods

Stroll into any home improvement store or lumberyard in Florida, and you’ll see pressure-treated wood stacked to the hilt like books in a library. Plywood, wood strips, beams, joists. They fly from the shelves by the truckloads every day, used to build the gazebos, decks, and playgrounds that sit in backyards. But there’s something in the wood you can’t see. It’s in the picnic table you ate on last Fourth of July. It’s in the swing set your kids play on every weekend. And it’s in the fence that surrounds your yard. Arsenic. It comes from a pesticide called Chromated Copper Arsenate, or CCA. Almost all pressure-treated wood in Florida is injected with CCA to protect it from termites, beetles, fungi, and the elements. Lots of people don’t have a clue it’s there, but the arsenic could be leaching into Florida’s soil at levels much higher than the state considers safe. At least that’s what a study conducted by a University of Miami College of Engineering researcher indicates. Helena Solo-Gabriele (B.S.C.E. ’87, M.S.C.E. ’88), an assistant professor in the Department of Civil, Architectural, and Environmental Engineering, along with her graduate students, collected soil samples from under nine pressure-treated decks in Florida and found arsenic in higher-than-normal levels in almost every case. Of the 65 samples collected, 62 exceeded state safety limits for cleanup at industrial sites.

BY ROBERT C. JONES, JR.
“We were funded to find out how much CCA was in the environment,” says Solo Gabriele, who collaborated with University of Florida researchers on the study. “And what we found is that there’s a lot, and the problem is only going to get worse.”

Even though Solo Gabriele’s study tested only soil from under pressure-treated decks, her research far-reaching implications for the state because there are lots of other wooden structures in Florida that contain CCA. “Everything from walkways, fences, and boat docks to playground equipment, utility poles, and park benches,” she says.

“There are elevated levels of arsenic in the soil,” she says. “CCA is basically applied to any wood intended for use in an outdoor setting.”

It also is present in your home. Wood that comes in direct contact with the foundation or an exterior wall has most likely been treated with CCA.

CCA-treated wood is not new. It’s been around for as long as 70 years. But its use as a wood preservative has drawn considerable local and national attention recently after studies such as Solo Gabriele’s have shown that arsenic is leaching out of pressure-treated wood and contaminating the soil at larger-than-normal levels.

The research conducted by Solo Gabriele was initiated through a disposal problem. Sugar companies in Florida for years had burned cane husks in boilers to produce electricity for their sugar mills. The leftover ash was then spread onto the fields as fertilizer, a process that proved to be an effective recycling option for the cane husks. But in the mid-1990s, routine testing of the ash showed elevated levels of arsenic. The cause: the sugar companies had started burning waste wood—a fraction of it CCA-treated lumber—along with the cane husks. (Sugar companies now have more stringent guidelines on the type of wood accepted at electrical plants.)

That’s when state regulators wanted to find out exactly how much CCA was getting into the environment. Solo Gabriele’s joint study with the University of Florida was one of the first major research efforts in the state aimed at studying the environmental impacts of CCA-treated wood. Data from their deck study has been reviewed by dozens of sources, including the wood treatment industry, which for years has defended CCA as a safe preservative.

“They haven’t questioned the results of our study,” says Solo Gabriele. “But what they do question is the interpretation of what the data mean. Here’s an environmental contaminant. There are elevated levels of arsenic in the soil, but does that affect health? That’s where the big controversy is and where a lot of the arguments are.”

Concerned parents who have playground equipment made from CCA-treated wood have inundated physicians, poison control centers, the Florida Department of Environmental Protection, and even Solo Gabriele with questions. “But it’s difficult to provide them guidance given that the health issues are within the gray area on this,” she says.

Even a small amount of arsenic is enough to kill someone. Long-term exposure can cause cancer. But what kind of health risk does arsenic slowly leaching out of pressure-treated decks, poles, play sets, and picnic tables pose?

“The whole issue around any so-called toxic exposure is, are you truly exposed?” says Lora Fleming, associate professor in the Department of Epidemiology and Public Health at the School of Medicine. “You have to interact with the material for it to be a problem, and the issue with potential exposure to CCA-treated wood is primarily oral exposure, which is controllable if people practice good hygiene.”

Thorough hand washing, especially for children, and the removal of shoes that have come into contact with sawdust from CCA-treated
lumber or contaminated dirt before entering your home are two ways of practicing good hygiene, says Fleming. "But to hysterically rip out all treated wood would be insane. We use pressure-treated wood because otherwise no structure made of wood in Florida would last," she says. Contaminated water wells and, very rarely, deliberate poisoning are potentially greater sources of arsenic for consumers than pressure-treated wood, says Fleming.

Despite demands from many concerned citizens and environmentalists to ban its use nationwide, CCA-treated wood won't be missing from the shelves of home improvement stores anytime soon. The U.S. Environmental Protection Agency reviewed the use of CCA as a wood preservative during the 1980s and concluded that it posed no unreasonable risk.

There are alternative building materials. "Wood is a good structural material; it's very lightweight and strong," says Solo-Gabriele. "But steel, concrete, and plastic lumber can easily substitute for CCA-treated wood in many applications."

So can wood treated with chemicals other than arsenic. Solo-Gabriele and her team of researchers have identified four such chemical preservatives that are just as effective in protecting wood as CCA. Three of the four are produced by the three biggest CCA manufacturers in the United States. Arsenic-free wood is available at retail establishments but costs anywhere from 10 percent to 30 percent more.

Soil tainted by arsenic leaching from pressure-treated lumber isn't the only problem. Solo-Gabriele's research has shown that CCA-treated wood also is contaminating untreated waste wood, which is recycled in Florida and used to produce electricity and colored mulch.

In order to recycle wood waste as fuel, it must contain less than 5 percent CCA-treated wood so that the resultant ash is not classified as hazardous. And wood waste recycled as mulch must contain less than 0.1 percent CCA.

But at three construction and demolition recycling facilities in Florida, Solo-Gabriele's study found CCA levels in their untreated wood piles far above the state's industrial soil clean-up target levels.

How does it get there? Before recycling facilities process waste wood, they sort treated from untreated wood. Many of these facilities rely on visual sorting techniques based on the green hue that treated wood exhibits.

"Wood used for marine applications has a strong green color to it," says Solo-Gabriele. "But the majority of wood is treated at lower retention levels and has a light green color. So when it gets dirty or has been weathered, it's hard to distinguish from untreated wood."

The result: Enough treated wood is inadvertently being sorted with untreated wood to seriously limit the recycling opportunities for wood waste.

Backed by grants from Sarasota County, Florida, the Florida Center for Solid and Hazardous Waste Management, and the Florida Department of Environmental Protection, Solo-Gabriele and her team are developing innovative recycling methods designed to sort CCA-treated wood from other wood types. One method, X-ray fluorescence, or XRF, has proved effective in detecting the presence of arsenic, chromium, and copper in treated wood.

Solo-Gabriele's work is critical for the environmental future of Florida. Today, roughly five million cubic feet of CCA-treated wood is disposed of in Florida each year, much of it through mulch or wood fuel and in unlined landfills that cannot capture the arsenic leaching from the wood. Environmentalists will be watching the results of her work closely. They are keeping a wary eye trained on the not-too-distant future: the year 2013, to be exact. That's when the quantity of CCA-treated wood in the state is projected to reach 35 million cubic feet.

Mathematical translation: 1,600 tons of arsenic each year.

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