CCA Treated Wood

The End of the Line
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CCA, short for chromated copper arsenate, is a wood preservative invented in the 1940s. It rose in popularity in the decades that followed, particularly during building booms. The preservative is a fungicide and insecticide protects wood products exposed to the elements and has been used on everything from fences, docks, decks, and even playground equipment and picnic tables. And while it might have kept wood from weathering, it hasn't been without controversy.

Initial concerns surfaced in the 1960s and centered on employees falling ill while using the preservative. As time went on, concerns expanded to include people working around of spending leisure time near the preserved wood. All the while organizations such as The Environmental Working Group, Beyond Pesticides, and Ban CCA pushed the US Environmental Protection Agency (EPA) to restrict the use of CCA treated wood.

In 2002, the wood treating industry voluntary decided to stop using CCA to treat wood for consumer products. Furthermore, labels, or end-tags, were required on each piece of CCA-treated dimensional lumber identifying the chemicals and informing the public that it should not be used in residential applications.

Demolition Debris with Possible CCA Treated Wood

Wood treatment Photo: Florida DEP

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In a February 12, 2002 press release on the voluntary ban, EPA estimated that within that year there would be a decline in production of 25 percent. The estimated decline for 2003 was 70 percent. While reducing the production of CCA treated wood and limiting its uses is admirable, there was no account for CCA treated wood already in use in residential applications, and neither was its disposal.

One State's Concern

But what about the disposal of the CCA treated wood that was already out there? It was a question asked by regulators in Florida—a state with 100 unlined construction and demolition (C&D) and Class III landfills that had been disposing of CCA treated wood for years.

"CCA wood was on the radar in Florida since the mid 1990s," says Tim Townsend, a professor in the environmental engineering department at the University of Florida. "Florida is unique. There is a tremendous amount of treated wood. And there is a high groundwater table and it's our drinking water."

Townsend explains that it was Bill Hinkley, a solid waste administrator with the Florida Department of Environmental Regulation (DEP), who has since passed away, that thought there

could be a connection between arsenic concentrations in groundwater and the disposal of CCA-treated wood in Florida's unlined landfills. As a result, Hinkley joined forces with Townsend and another researcher, Helena Solo-Gabriele, a professor and associate dean for research in the civil, architectural, and environmental engineering department at the University of Miami. What ensued was 12 years of research that continues today.

Yard Waste processing Photo: Florida DEP

The basis for the research was this. While the production of CCA-treated wood was limited, plenty still remained in service and the amount requiring disposal was only going to rise. Research estimated that even when the phase-out was complete in 2004, that levels of disposal would not peak until 2010. In Florida 10 million cubic yards (cy) of CCA treated wood had already been disposed, by 2041 it's expected there will be 21 million cy more. Without rule changes, the majority of this wood would be disposed of in unlined landfills.

The direction of research has progressed over the years. It began with bench-scale studies to determine the potential for metals to migrate from treated wood into the environment. It's developed into full-scale pilot studies to help evaluate realistic options for full-scale identification and separation of treated wood.

The challenge was to make the disposal of CCA treated wood safer, for people and the environment, without impeding the wood recycling and disposal industry. The DEP acted on the challenge by organizing a Technical Advisory Group (TAG), bringing together professionals from industry, academia, and consulting to consider the data and evaluate options.

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"The Florida DEP often organizes TAGs to evaluate technical issues as a precursor to regulatory rule development. Waste Management tries to participate in TAGs and Rule Making Workshops that involve solid waste issues in Florida, as well as other states," says Steve Clarke, director of environmental protection, Waste Management South Group.

Waste Management, like other waste management firms, has a stake in solid waste regulations in Florida. The company has five C&D and five Class III facilities in the state and changes to the rules would reverberate through their facilities.

The TAGs considered several issues: groundwater contamination through disposal at unlined landfills; groundwater contamination and hazards associated with human exposure from mulch; and, the potential of air and groundwater contamination from the burning of CCA wood that would potentially create an arsenic-laden ash or cause the release of air-borne arsenic due to inadequate air handling systems. The latter was considered in light of the growing trend of biomass facilities in Florida that are not bound to the same air quality restrictions as municipal solid waste incinerators.

The DEP held numerous TAG workshops in all parts of the state from 2003 until 2008. And from the workshops came rules and recommendations for best management practices.

"DEP used the recommendations of the TAG Committees to develop new rules for management and disposal of the CCA wood waste. DEP held a series of rule-making workshops on proposed changes for CCA waste disposal," says Brian Tindell, Waste Management's central disposal landfill District manager.

The rule change being developed was proposed to target three areas involving CCA treated wood. According to the proposed law, CCA treated wood will no longer be allowed to be incorporated into compost or made into mulch, decorative landscapes chips or other wood products that would likely be applied as ground cover, soil, or a soil amendment. Also prohibited will be the burning of CCA treated wood through either open burning or in an air curtain incinerator.

And lastly, it was decided that facilities without liners would be required to submit a management plan describing how they CCD treated wood is handled at their facility. The plan will describe efforts to minimize the amount of treated wood delivered to a facility and the procedures used by operators to make a reasonable effort to sort it out once there.

Another rule change that came about as part of the TAG workshops, is the requirement that Class III landfills will be required to have bottom liners. Previously, the need for a bottom liner was left to the discretion of the regulator. With this rule change, liner requirements will be more consistent across the state—no bottom liner, no permit.

A Needle in a Haystack

Even with the law in place, the challenge remains. How can CCA treated wood be effectively kept out of or removed from process streams headed for recycling or disposal? More importantly, can it be done without bringing operations to a standstill?

One solution posed by the working groups and DEP was to avoid collecting the prohibited wood in the first place. Considerations include separate collection for CCA treated wood, either from the curb or at construction sites. Even if a relatively successful collection strategy was in place, it's likely that sorting, even on a more diminutive level, would still be needed at the disposal and recycling facilities.

At least a portion of CCA treated can be identified by visual inspection or through field tests. Both require individual handling of each piece of wood.

Telephone Poles Photo: Florida DEP

Visually, the wood can be inspected and separated based on several characteristics. An obvious item to spot is the end-tag required for CCA treated wood. The label identifies the preservatives contained in the wood and the intended use of the product. Inspectors can also look for incisions in the wood, where cuts were made to allow for deeper penetration of the preservative.

Larger pieces of CCA treated wood used for industrial purposes, such as railroad ties and utility poles, are easily identifiable. But smaller pieces from residential use are harder to find and pull out. Not quite a needle in a haystack, but close. Even with smaller pieces, it's often the shape of the material that's used to determine whether it should be pulled from the pile. If wood waste looks like it came from outdoor decking or fencing, it should be pulled to the side.

Color is another identifier of CCA treated wood, but it's tricky. Chemicals that contain copper, such as CCA, will turn the wood green. Shades will vary depending on the concentration of the preservative and the age of the wood. And while CCA does contain copper, other preservatives such as alkaline copper quaternary (ACQ) and copper boron azole (CBA), contain copper as well, but do not fall under the restriction of the new rules. And after years in service, the green from any treatment processes will fade to silver, looking nearly the same as untreated wood making a determination based on color all the more difficult.

Beyond visual inspection, there are various field tests that can be used to help identify CCA treated wood. One of the more useful stains is the PAN indicator used to identify copper present in treated wood. Originally developed by the wood treatment industry as a quality control check, its usefulness translates. When applied to wood containing copper, the stain ranges in color from magenta to red. If there's no copper present, the stain turns orange. It takes approximately 12 seconds for the color change to appear. Unfortunately, the results can be affected if the wood is wet or painted. Also, the color can indicate the presence of copper when other copper-containing preservatives, not affected by the rule, are present.

Another method used to identify treated wood is x-ray fluorescence, or XRF, because each individual element such as copper, chromium, and arsenic has its own measurable fluorescence identifier. By pointing a portable hand held device, shaped like a gun, at the wood, concentrations of set elements can be calculated in a matter of seconds. XRF technology is versatile and has been used on rocks, soil, and even more recently on children's toys.

"For facilities to visually identify wood by the shape of the pole, if it's a piling, if it was used outside. If it's green, it's likely treated. Chemical stains are OK, but they are time consuming. There are piles of wood, and you have to spray and move each piece. It's OK for a spot check," says Solo-Gabriele, noting that these techniques work, but at full-scale can be time consuming.

Another field test can be used to determine if the wood contains arsenic, but has disadvantages. For this test, sawdust is mixed with water, strong reagents are mixed-in, and a test stripped is added to measure color change. The test takes 45 minutes, requires the use of chemicals, and produces arsine gas, making it an unlikely contender.

XRF Gun Photo: Helena Solo-Gabriele

Going Full-Scale

While the goal is to avoid the disposal of CCA treated wood in unlined landfills, or burned or used as mulch, regulators understand it will be a challenge and don't realistically expect all of the CCA wood to be removed.

"Some people want to call this a ban," says Tedder. "We are not banning disposal in unlined facilities, but we want them to make a reasonable effort not to." Tedder cited statistics that visual inspection could reasonably remove 70 percent of treated wood, leaving 30 percent going through. "If they can get 50 percent separated out, then it's time well spent," says Tedder. He's quick to point out that facilities that choose to completely ignore the rule will be found in violation.

But visual inspection is still time consuming. That's why Solo-Gabriele is working on potential full-scale methods to identify and sort out prohibited wood. Solo-Gabriele's pilot study employs XRF technology to effectively identify and ultimately sort CCA treated wood from an incoming stream. Her efforts utilize an on-line configuration, as opposed to a hand held version of the equipment, as its more amenable to full-scale application.

Solo-Gabriele had considered other technologies for the pilot study, but the identification rates using the XRF were higher than those with visual and PAN indicator. Not only was better separation achieved, the XRF could be used on wet and dirty wood and is able to identify numerous elements in a matter of seconds.

XRF Helena Photo: Solo-Gabriele

Working with the Town of Medley, Florida, Solo-Gabriele investigated alternatives to improve sorting ability that might otherwise limit recycling options for dimension lumber. The study included two full-sized belt conveyors, one with an XRF-detection chamber mounted on top.

As wood moved along the conveyor belt, treated wood was diverted as untreated wood continues onto the second conveyor into a separate area. The system used a series of equipment including a detection chamber, control panel, computer, and a pneumatic piston all working in sequence to identify and then remove treated wood from the process stream. The results were promising. In a stream comprised of equal parts treated to untreated wood, 90 to 99 percent of the wood containing arsenic was separated out. In streams with 95 percent untreated and 5 percent treated, 80 to 96 percent of the treated wood was diverted—far exceeding DEP's expectations.

The Mulch Police

A portion of the initial research performed on treated wood included grinding the material. As results indicated the potential for the treatment chemicals to leach, a correlation was made. If ground up, CCA treated wood pose a risk when disposed of in unlined landfills, should it be placed in lawns and gardens?

Bob LaGasse, executive director of the Mulch and Soil Council (MSC), a non-profit trade group of producers of horticultural mulches, consumer potting soils, and commercial growing media explained that when the research surfaced, the mulch industry was hit hard.

“Florida was the first state to discover there was an issue with CCA wood being ground and sold to the public in garden mulch,” says LaGasse. “It raised the issue of CCA wood with elevated levels of arsenic being sold to the public. ‘Red mulch causes cancer’ is not good PR.”

Because of the complexity of regulations that affect CCA treated wood, none of which specifically policed the components of mulch, in 2003 the council began to develop their own standards. By July 2004, standards were in-place that provided a sampling and analysis protocol for CCA treated wood and provided a certification for products that passed.

“We’re self-policing,” says LaGasse. “All of the mulches are periodically inspected for CCA contamination. We pull market samples from plants where material is ready for shipping.”

Mulch label Credit: MSC

The protocol developed by the council includes grinding the material into 1/16-inch pieces. Analysis is performed on various materials including virgin and recycled wood, along with spiked samples with known concentrations of treatment preservatives.

“The North Carolina State University tests for copper, chromium, and arsenic. A spike in all three means there is CCA. Then we send the sample to an EPA lab for verification,” says LaGasse. If products are found to contain CCA, they are de-certified. The next step is to find the source and prove the issue has been resolved. Once that’s done, an expedited testing process begins.

Products that pass the test are labeled with the MSC certification seal and listed on the council’s website. The council admits that it is not possible to test every bag of mulch, but believes that random testing and exposure of those who violate the certification process has been a deterrent to using CCA treated wood.

“Participation is a voluntary program,” LaGasse says. “Members who are certified have a concern to demonstrate compliance with industry standards and concern for their customers.”

Successful Passage

Passage of the rule has had its setbacks, not because of the content, but because of new requirements that each rule must be evaluated on an economic basis. The DEP was required to prepare a statement of estimated regulatory cost (SERC) to determine the impact a rule change would have on small businesses.

“DEP has one full-time economist who must now prepare a SERC for almost every rule,” says Chris McGuire, assistant general counsel for the DEP. McGuire explains that the schedule includes a re-brief for the environmental regulation commission in March 2009, with the rule being adopted in May 2009. A benefit to the delayed passage is that there has been plenty of time to prepare.

Like the MSC, many in the industry have already set in motions plans for certifying products or sorting out CCA treated wood. Professionals, like those with Waste Management, don’t expect the exact date of the rule change to impact operations.

“Waste Management landfills in Florida have already implemented the BMPs and started following the proposed changes once the regulations were close to being finalized. The regulations already require spotters at our facilities and they do a great job identifying and removing prohibited wastes,” says Tindell. “We anticipate that there will be some additional training of our Spotters and Gate House Attendants so that they understand the BMPs and regulations.”

As Florida takes the first step to regulate the disposal and recycling of CCA treated wood, it’s yet to be seen whether other states will follow. It has been a long road that’s sure to continue as techniques and technologies continue to develop to identify preserved wood, potentially making it easier and cost effective to remove the products, rather than simply direct loads to a lined facility for disposal.

One concern with the difficulty in sorting is that facilities may choose to send more wood to lined landfills rather than sort through it—a step backwards for recycling. “It is our goal to separate out the wood,” says Solo-Gabriele. “So the good wood can be used as mulch or biofuel.”

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