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Using CCA Preservative–Treated Lumber in Gardens and Landscaping

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Many biological organisms, such as insects and decay fungi, can destroy wood and other materials. Anyone who has experienced termite or wood decay (rot) in their home will know this to be the case. The purpose of incorporating preservative chemicals into wood products is to make the wood toxic to the organisms that would ordinarily consume it, and thus increase its useful service life. Some preservative chemicals can be purchased by the consumer and then applied to the wood product by dipping, brushing, or spraying. Other preservative chemicals, such as chromated copper arsenate (CCA), are intended only for use in pressure-treated wood and cannot be purchased separately.

Pressure-treated wood is used widely in landscape, garden, and structural applications, including retaining walls, raised-bed gardens (fig. 1), decks, and play structures (fig. 2). It is also commonly used for some for certain components in wood-framed construction. CCA-treated wood is typically light green in color (fig. 3), but it sometimes contains a dye that turns it a brownish color (fig. 4). Each piece of lumber contains either a stapled-on tag or a stamp that indicates the type of preservative used and other information (figs. 5 and 6). The color of the wood is usually the best indicator of the preservative used, since tags may come off and stamps may not always be on the exposed portion of the lumber surface. In the southern and eastern parts of the United States, where the predominant wood species used in construction is southern yellow pine, CCA-treated lumber is used for more applications than are common in

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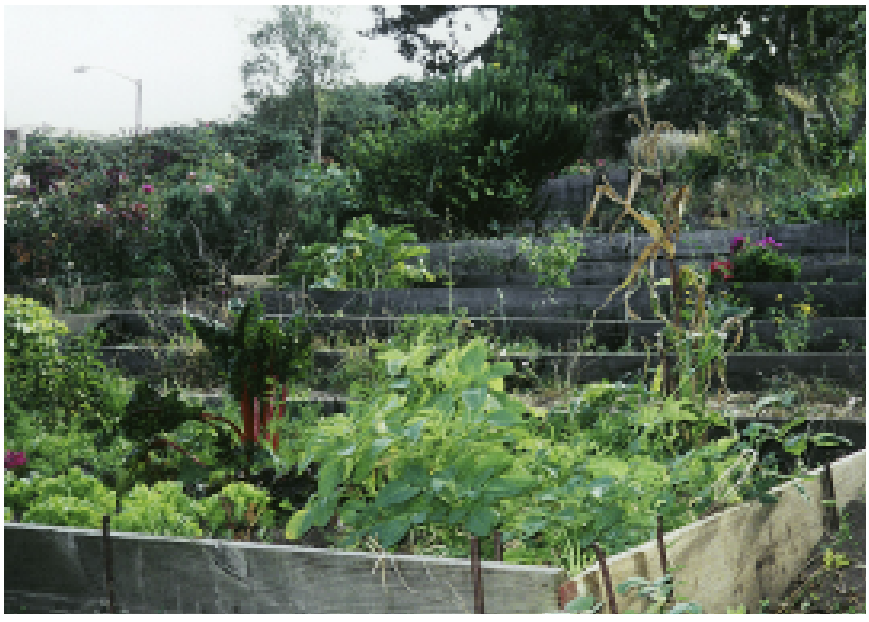

Figure 1. CCA-treated lumber was used on the end of this raised-bed garden. The member in the foreground of the photo is redwood.

Figure 2. CCA-treated wood was used in this play structure.

Figure 3. The typical color of CCA-treated lumber is the light green shown here. Note that the treatment identification tag is still attached to this member.

Figure 4. CCA-treated lumber can contain a brown dye to change the color from the "natural" light green color.

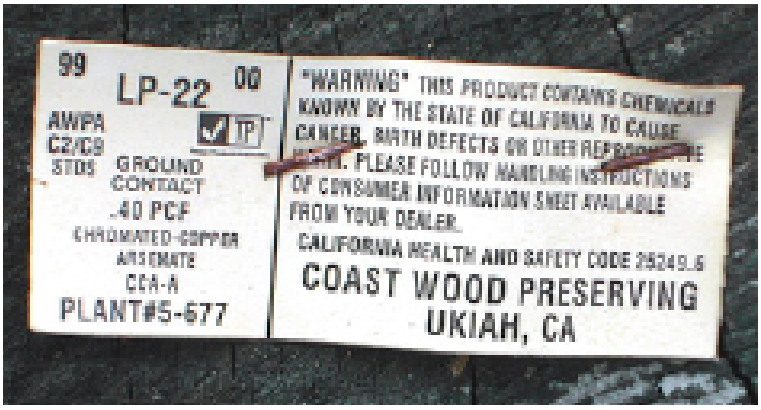

Figure 5. A treatment tag stapled to the end of a piece lumber indicates the type of preservative ("CCA-A"), along with other information, including the amount of preservative used ("0.4 pounds per cubic foot"), treating company and location, and a health and safety statement.

California. For example, whereas CCA-treated lumber is commonly used as deck boards in other parts of the United States, in California it is far more common to use redwood, and more recently plastic lumber composites, for this application; treated lumber is often used only for the underlying structural support members. Also, because of the difficulty in treating Douglas-fir, a very common construction material in the western United States, with CCA, this preservative is used less. Most CCA-treated lumber in California is either hemlock or white fir (i.e., lumber in the "Hem-Fir" species group).

Human health, food safety, and environmental concerns regarding the use of treated wood in general, and CCA-treated in particular, have developed in recent years. The wood treating industry has voluntarily withdrawn CCA-treated lumber intended for use in the more common residential applications, although it will still be available for industrial uses. This withdrawal took place effective January 2004. Alternative treated wood products are currently available, such as amine or alkaline (depending on the formulation) copper quat (ACQ) and copper azole (CA), and more will be offered. However, questions regarding the proper use, safety, and disposal of CCA-treated lumber remain. This publication summarizes research-based information, and provides guidelines and options for do-it-your-selfers and contractors, regarding the use and disposal of CCA pressure-treated wood.

Figure 6. A grade stamp may also be found on some pieces of treated lumber. Except for the health and safety statement, the same information is found on the stamp that is contained on the tag.

BACKGROUND

Toxicity concerns regarding pressure-treated wood have been primarily focused on the toxic effects of arsenic in CCA-treated lumber. The United States Environmental Protection Agency (U.S. EPA) has classified arsenic as a human carcinogen (U.S. EPA 2003). This classification is based on studies of smelter workers in the United States and other countries (inhalation exposures) and persons in Taiwan exposed to arsenic in drinking water (ingestion) (U.S. EPA 2003). Long-term exposure to low levels of arsenic can also result in noncarcinogenic toxicity (Harte et al. 1991). It is well documented that arsenic can be toxic by ingestion, by inhalation, and by absorption through the skin (Opresko 1992). Arsenic is a naturally occurring element in the soil, and it is generally present in relatively small amounts throughout California (Bradford et al. 1996). Health concerns about exposure to arsenic from treated wood focus on exposure in excess of the naturally occurring background levels. There is no evidence that copper and chromium in treated wood are carcinogenic (U.S. EPA 2003).

Studies have shown that, although most of the elements used in CCA are fixed in the wood, some amount of arsenic, chromium, and copper can be dislodged from the lumber as a result of exposure to rain, deck washes containing brighteners (with associated lower pH), and irrigation water (Cooper 1994; Lebow 1996; Lebow et al. 2000; Scientific Certification Systems 1998; Stillwell and Gorny 1997; Taylor et al. 2001). Incorporating CCA-treated blocks in compost bins has also been shown to increase the leaching of all components, but in particular copper (Cooper and Ung 1995). For those working with CCA-treated lumber, exposure can result from inhalation of dust when cutting treated wood, from contact with skin during handling, or from ingestion of arsenic that comes off the treated wood. For the typical consumer, exposure could result from leaching of arsenic from the treated wood into the adjacent soil or by touching treated wood. In the case of leaching into the soil, the concern would be related to ingestion, either directly from the soil (for example, a child playing on the ground and then putting his hand in his mouth), or by eating vegetables or other crops grown in the vicinity of the treated wood, whereby arsenic would be taken up in the root system of the plant and be incorporated into the edible portion. The types of end-uses that could result in these ingestion-type exposures include compost bins, raised-bed gardens, play structures, and decks constructed with CCA-treated lumber. Because children have much smaller body masses than adults, and because they are much more prone to put their hands in their mouths, there has been a special emphasis on assessing the potential for toxicity of CCA-treated lumber used in playgrounds.

The chemicals that leach from CCA-treated lumber are rapidly adsorbed by soil particles. The amount in the soil decreases rapidly with distance from the treated lumber (Cooper 1994). Vegetables grown immediately adjacent to treated wood may incorporate limited amounts of arsenic, but based on U.S. Public Health Service standards, these vegetables would still be safe for human consumption (Alamgir et al. 2001). Speir et al. (1992) reported no deleterious effect to plants growing in soil containing CCA-treated sawdust, but also reported that at unnaturally low pH levels some root crops (beets in this study) would accumulate chromium, copper, and arsenic to levels that would be of concern. Over time, soil adjacent to treated lumber in a raised bed garden will likely be mixed and distributed throughout the garden area, thereby diluting the effect of the arsenic that is leached. As previously stated, the amount of chemicals leached from lumber decreases over time, with exposure.

There is strong evidence indicating that simply coating CCA-treated lumber with paint reduces leaching (Stehouwer 2002; Stilwell and Gorny 1997; Stilwell 1998). In weather-exposed areas, however, any applied coating would eventually erode, reducing its effectiveness, and reapplication would be necessary. Regarding use of CCA pressure-treated wood in raised bed gardens, inserting a layer of plastic sheeting between the wood and

the soil would provide the same separation as a paint film, with potentially a longer effective service life, and would reduce the risk of exposure.

EXISTING STRUCTURES MADE WITH CCA-TREATED LUMBER

For decks and other structures made with CCA-treated lumber, the question arises as to whether they should be removed. A lot of what we know about exposure to arsenic comes from studies of long-term consumption of arsenic-contaminated drinking water, not from exposure to CCA-treated lumber (West 2002). In considering treated lumber, one of the key steps in thinking about the health risk is to determine what the arsenic exposure is. Exposure is a function of how much arsenic is dislodged from the surface of the lumber and how efficiently it is transferred to the human body. An example of this kind of exposure could include working with treated lumber and then eating food without washing your hands. Residues may be ingested in this way. Similarly, playing in soil under a deck, or on a play structure made with treated wood, may result in exposure when contaminated hands come into contact with the mouth. This avenue of exposure would be particularly applicable for children. Given these real potentials for exposure, how much arsenic will likely be transferred to a given human body? Several published studies (Sharp and Walker 2001; Florida Physicians Arsenic Workgroup 2002; Gradient Corporation 2001; Roberts and Ochoa 2001) estimate the lifetime risks for cancer associated wtih CCA-treated lumber, ranging from a large risk to one that is relatively small. The variability in the results (i.e., the risk) is due to the set of assumptions regarding how much arsenic is available and how much is actually transferred.

In these studies, skin exposure has been estimated either by wiping the surface with a hand or with a wipe, sometimes moistened, and then measuring the amount of arsenic dislodged. Studies using wipes have been shown to produce risks that are much greater than those obtained when using hands alone. Scientific Certification Systems (1998) conducted a study on this point and found that a cloth wipe removed 2 to 6 times more arsenic than a hand wipe. Similar results were obtained in studies of pesticide-treated wood (U.S. EPA 1999). For these reasons we have relied primarily on studies using hand wiping of the wood surface.

In considering this data it is important to note that older CCA-treated decks and play structures have already leached a large percentage of their available dislodgeable arsenic, and over time the amount of available arsenic continues to decline and produces less risk from skin contact exposures (Hingston et al. 2001). Only one study, conducted and published by the Environmental Working Group (Gray and Houlihan 2002), reported no reduction in available arsenic in older, weathered lumber relative to more recently treated wood. These results are in contrast to all other publications that were reviewed in preparing this document (e.g., Hingston et al. 2001; Lebow et al. 1999).

An independent toxicology assessment firm, receiving industry funding, reviewed the available animal toxicity and human occupational studies regarding exposure to arsenic associated with CCA-treated wood. They considered a range of exposure routes and expected exposure levels for both adults and children and concluded that the use of CCA-treated wood in residential and playground settings does not pose significant health risks to children or adults (Gradient Corporation 2001). Both the U.S. EPA and the preservative industry agree that existing structures built with CCA-treated materials are safe and need not be removed from service prematurely. Based on the literature reviewed in preparing this document, these recommendations seem appropriate.

DISPOSAL

CCA-treated lumber is not considered a hazardous waste and can be disposed of in municipal waste landfills. This means that it can go out in your regular garbage pick-up. It is always preferable to use excess lumber pieces in other projects rather than disposing of them.

BURNING

Published literature clearly supports recommendations that CCA-treated wood should not be burned under residential conditions (for example, in a residential fireplace). Regardless of the exact combustion conditions in the fireplace, some (potentially small) amount of arsenic will become airborne in the smoke, and arsenic, copper, and chromium will also be found in the ash (Dobbs and Grant 1978; McMahon et al. 1986; Peters et al. 1984), so the ash also should not be composted.

SUMMARY AND RECOMMENDATIONS

Wood treated with chromated copper arsenate (CCA) will no longer be available to the general public for most residential applications beginning in January 2004. CCA-treated products used predominantly for commercial applications will still be produced (for example, utility poles and cross arms, and timbers used for highway construction), and could still be found selectively in residential applications, such as large glued-laminate beams and plywood. Alternative preservative-treated wood products are currently available, such as amine-alkaline copper quat (ACQ) and copper azole (CA). Others may also be offered now that CCA has been withdrawn.

The U.S. EPA has concluded that CCA-treated lumber does not pose an unreasonable risk to the public and there is no reason to prematurely remove structures or other items constructed with this material.

Raised planter beds constructed with CCA-treated lumber have not been shown to present a health hazard. Any of the dislodged elements from the CCA-treated lumber will be adsorbed onto soil particles in close proximity to the lumber. If concerns remain regarding exposure, treating the lumber surface with paint or using a plastic liner between wood and soil will provide almost total isolation between the treated wood and the soil.

Leaching of the preservative chemicals is greater in small particles, such as sawdust generated by cutting CCA-treated lumber; therefore, sawdust and other treated lumber pieces should not be used in compost piles or otherwise used as soil amendments.

CCA-treated lumber should never be burned, as the smoke particulates can be inhaled and can be toxic.

Some common “bottom line” recommendations apply when working with CCA-treated lumber:

- Work outdoors or in a well-ventilated area.
- Wear gloves to prevent absorption of the preservative materials through the skin.
- Wear goggles and a dust mask (for additional protection, a respirator can be worn).
- Clothing worn when working with CCA-treated lumber should be washed separately from other laundry.
- Wash after working with treated lumber.
- Don’t burn treated wood in your home.

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FOR FURTHER INFORMATION

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