



The Safe Playgrounds Project

A project of the Center for Environmental Health



Frequently Asked Questions about Arsenic & Pressure-treated Wood

->> For information on SEALANTS, see Question 12 <<-

1. What is pressure-treated wood?

Virtually all of the lumber sold for outdoor uses in the United States has been pressure-treated. Since the 1970s, most of this lumber was treated with the preservative **chromated copper arsenate (CCA)** to protect against weather, mold, and insects. In the pressure treating process, a freshly milled board is placed inside a vacuum chamber and all of the air and water is sucked from its fibers. Then, under high pressure, copper, chromium and arsenic are forced into the now empty cells.¹ It is also known as arsenic-treated or CCA wood.

2. What is CCA wood used for?

CCA wood has been used for outdoor residential structures such as playground equipment, fences, gazebos, decks, landscaping timbers, benches and picnic tables. It has also been used for outdoor industrial structures such as utility and construction poles, marine timbers and pilings.

3. Why the sudden concern about arsenic in CCA wood?

Arsenic is a known carcinogen and is more toxic than previously thought.



Although it was recognized early on that people would be exposed to some amount of arsenic with the widespread use of CCA wood, the public health concern has escalated with the discovery that arsenic is a far more potent skin, bladder, lung and kidney carcinogen than previously believed.

Children can ingest (swallow) it. Recent studies have confirmed that high levels of arsenic can be released to children's hands by direct contact with arsenic-treated wood. Children under 6 are particularly prone to hand-to-mouth activity. Children are more vulnerable than adults because their brains and bodies are still developing and changing². Children may be at greater risk from arsenic than adults because their livers metabolize it more slowly.

4. What are the health risks associated with arsenic?

Arsenic is classified as a “known human carcinogen” by the U.S. Environmental Protection Agency (EPA) and the World Health Organization. Arsenic exposure has been linked to skin, bladder, lung, kidney, and liver cancer.

Arsenic causes a wide range of adverse health effects at high, moderate and low doses. Symptoms from exposure to high levels that are not immediately deadly include nerve damage, vomiting, fatigue, diarrhea, nausea and the decreased production of red blood cells. Similar effects can also occur after long-term arsenic ingestion (of five to fifteen years) at low to moderate levels. Arsenic is tasteless, colorless and odorless. Arsenic exposure has also been linked to immune system suppression, increased risks of high blood pressure, cardiovascular disease, endocrine disruption (altering normal hormonal levels or activity in the body) and diabetes.³

5. How are people exposed to arsenic?

Exposure to arsenic can occur directly through skin contact with CCA-treated wood, or more indirectly through arsenic-contaminated soil, groundwater or surface water. The human pathways of arsenic exposure include ingestion (swallowing), inhalation and skin absorption - although EPA has concluded that arsenic from treated wood is not absorbed through the skin⁴.

Ingestion of arsenic is the major concern for children's play sets and picnic tables since children pick up arsenic residues on their hands from the surface of the wood and then are exposed when they put their hands in their mouth. Children can also be exposed to arsenic through splinters or by ingesting contaminated soil.

NOTE: Sanding or cutting CCA wood creates arsenic-laden wood dust that can be easily inhaled or can wash off the surface to contaminate the ground below. Arsenic is an even more powerful carcinogen when inhaled than when ingested.

6. How significant is the health risk posed by CCA-treated wood?

Arsenic poses a definite health risk, but estimates vary significantly.

- Several recent major studies have estimated the additional cancer risk (skin, lung, bladder) to range anywhere from 23 up to 2000 cancer cases per million population due to contact with CCA lumber.

- **NOTE:** All of these studies found a risk considerably higher than the one additional cancer case per million which is the limit usually considered acceptable for a consumer product.
- This wide range in estimates is probably due to the inclusion/exclusion of different types of cancer and differences in study assumptions/designs.

7. What's being done about the health threat posed by CCA-treated wood?

In response to mounting evidence that arsenic is a more potent carcinogen than originally thought, the United States and many other countries have or are in the process of phasing out CCA-treated wood.

The U.S. Environmental Protection Agency (EPA) and the wood products industry negotiated a voluntary phase out of CCA-treated lumber used in residential applications. This action stopped the manufacture of CCA-treated wood for most residential uses as of January 1, 2004.⁵ However, this action doesn't address the many existing CCA structures currently in use and companies are allowed to sell off any existing stock produced before the deadline.

Public education campaigns like the Center for Environmental Health's Safe Playgrounds Project are being launched to inform communities on how to minimize risk.

An ongoing study sponsored by the US EPA and the US Consumer Product Safety Commission is evaluating the effects of sealants at reducing the risks due to surface residues of arsenic on treated wood. Results are expected to be released sometime in 2005.

8. What are the applicable laws for public play structures made with CCA wood in California?



The California Health and Safety Code 115775 requires CCA-treated playground equipment purchased by the state to be sealed with a nontoxic and non-slippery sealant every 2 years⁶. However, it is recommended that CCA wood structures are stained at least once per year. See Question 12 for more details about sealing CCA wood.

treat the CCA structure with two coats of solid or semitransparent oil-based deck stain at least once a year. On high traffic areas or surfaces (e.g. handrails, steps or deck boards) that receive intensive hand contact, these treatments may have to be applied more frequently. However, replacing high traffic sections with non-arsenic alternatives is preferable to sealing them.

See Questions 12 to 15 for more details and handling precautions.

12. What are currently considered the best methods of making a CCA lumber surface safe from arsenic exposure?



CURRENT RESEARCH INDICATES THAT TREATING CCA LUMBER WITH (2 COATS* OF) SOLID OR SEMI-TRANSPARENT OIL-BASED DECK STAIN WILL GENERALLY LOCK IN MOST OF THE ARSENIC FOR APPROXIMATELY ONE AND A HALF YEARS (18 MONTHS).

***Use 2 coats the first time you stain the structure.**

- The containment period may be less for surfaces receiving extensive foot traffic or hand contact, such as railings or playground equipment. Ongoing visual monitoring at a six-month interval and restaining at least once a year are recommended as long as the CCA wood is in use.
- An outdoor deck stain requires minimal surface preparation. One with a strong color can help to identify when the stain is wearing.

It is very important to reapply these treatments at least every year. Preliminary evidence shows that after a two year period arsenic dislodgement can actually increase over pre-treatment levels.

Note: Other types of commonly available outdoor wood waterproofing agents and/or sealants typically only reduce arsenic release from CCA lumber for about 1 to 6 months. Also, outdoor paints tend to flake and peel, requiring considerable surface preparation before recoating - and sanding is NOT recommended.

California agencies are required to seal public play structures every two years. See Question 8 for applicable laws.

See Questions 13 and 14 for other tips, and 15 for handling precautions.

13. What should I do if the results from the arsenic test kit estimate a high exposure risk?

THE BEST LONG-TERM SOLUTION IS TO REMOVE THE CCA-TREATED WOOD (AND THE SOIL BELOW*). However, in some cases, it may not be feasible to dismantle the CCA structure and completely replace it with arsenic-free wood or alternatives.

If you can not replace the CCA wood immediately, you should seal the wood at least once per year. See Question 12 for details.

If possible, focus on replacing the sections of the structure that receive the greatest skin contact such as handrails, steps or deck boards with non-arsenic alternatives. Sealing to encapsulate arsenic is an imperfect solution that requires ongoing maintenance and inspection to guarantee acceptable results. It is for this reason that you should prioritize replacing the CCA wood sections that children frequently touch with a non-arsenic alternative rather than sealing with a finish.⁷

See Questions 14 and 15 for other safety steps and precautions.

*See Question 17 for more information about soil contamination.

14. How can I minimize arsenic exposure if my child plays on CCA lumber?

For existing CCA treated structures, there are a few simple steps that can drastically decrease arsenic exposure.

- Make sure children wash hands to avoid hand-to-mouth contact after touching CCA lumber and especially before eating.
- Don't allow children or pets to play in dirt or sand around CCA structures or to play on rough wood surfaces. CCA wood splinters can be dangerous.
- Don't store toys or tools under CCA decking exposed to precipitation. Arsenic leaches from the wood when it rains and may coat things left there.
- Avoid eating vegetables grown in proximity to CCA lumber.
- Keep food off CCA surfaces. Use a tablecloth on CCA wood picnic tables.

See Question 13 for other important action steps.

15. What precautions should I take when handling CCA wood?

- **Surface preparation should focus on cleaning, rinsing and drying.**
- **Don't sand or cut CCA wood** unless you have the proper protective equipment and clothing. Sanding or cutting CCA wood creates arsenic-laden wood dust that can be easily inhaled or can wash off the surface to contaminate the ground below. Arsenic is an even more powerful carcinogen when inhaled than when ingested.
- **Avoid pressure-washing CCA wood** which can disturb and disperse the arsenic.
- **Avoid acid-based or highly oxidizing cleaners and deck brighteners** which can convert chemicals on the wood to a more toxic form.
- **Never burn CCA wood** since this releases the arsenic in the form of a toxic gas and there is arsenic throughout the resulting ash, which is highly toxic.
- **Application techniques:** Brush application will pick up some arsenic from the surface and distribute it to other parts of the structure as well as contaminate the container. Roller application is less likely to move the contaminants because there is less abrasion during the treatment process. Spray application is least likely to move contaminants. For this reason, spray or roller application is preferred when practical.⁸
- **To avoid dispersing arsenic contamination,** minimize brushing applications, work from small containers, and use up excess rather than pouring back into the original can. If a second coat is applied, use a clean applicator and a clean supply of coating. Brushes and rollers used for arsenic protection should not be used for other purposes.⁹

See Questions 13 and 14 for other important recommendations and precautions.

16. Can CCA lumber give off arsenic into the air to be inhaled?



Generally, the answer is no. The CCA is considered non-volatile. **However, never sand CCA lumber surfaces! This sends fine arsenic-laden dust into the air and has caused some of the most acute arsenic poisoning cases. Arsenic is an even more powerful carcinogen when inhaled than when ingested.**

Also, recent research conducted in Germany indicates that fungal and bacterial growth on old CCA lumber can convert some of the arsenic to a volatile chemical form which can evaporate into the air.

17. What about arsenic contamination of the soil or sand under and around CCA wood structures?

- Research shows that the soil around CCA wood structures is very often moderately to highly contaminated with arsenic. A kit to test arsenic levels in these soils is available at www.safe2play.org for \$20. Children and pets should not play in the soil under or near CCA structures until it has been tested for arsenic. Contact should be avoided if testing shows more than 5 µg/g (micrograms of arsenic per gram of soil) present.
- The amount of arsenic in soil that is considered safe for normal human contact varies greatly from state to state with a range of 0.8 µg/g up to 20 µg/g. Growing edible crops should generally be avoided in such soils.
- In the case of a structure on grass and soil, it is generally advised to re-sod the area within a 4 foot radius from where the posts were. This is extra work, but definitely recommended in terms of safely protecting against arsenic exposure.

18. What should I do if CCA wood is in or near my garden?

Avoid eating vegetables grown in proximity to CCA lumber. Research shows that green leafy vegetables are the most likely to take up arsenic, while plants such as tomatoes appear to take up very little if any arsenic from soil. However, if the vegetable (e.g. tomatoes or carrots) contacts the soil and gets soil residue on it, this can constitute a significant arsenic ingestion route also.

19. In terms of arsenic exposure risk, does it matter if the CCA lumber surface is wet or dry?

Wet surfaces seem to pose an increased exposure risk when touched compared to dry ones, although both wet and dry CCA wood surfaces may transfer high amounts of arsenic. Damp hands will also pick up more arsenic than dry ones.

20. How long does CCA lumber continue to be an arsenic exposure hazard? Does risk go down over time?



CCA lumber of all ages can transmit high levels of arsenic. On average, the amount of arsenic transferred from a CCA board surface to hands decreases only slightly over many years.

21. What alternatives to CCA lumber are now available?

- **Suggested replacements for CCA lumber include untreated, naturally decay-resistant woods which are sustainably harvested or reclaimed. Examples are redwood or cedar.**
- **Other structural materials can be used including composite lumbers (a permanent melding of sawdust and recycled plastics such as polyethylene), concrete, metal, and plastic (but avoid polyvinyl chloride (PVC) plastic).**
- **Two commercially available outdoor treated lumber products that are alternatives to CCA are ACQ (ammoniacal copper quaternary) and CBA (copper boron azole). ACQ does not contain any EPA-listed compounds or any known or suspected carcinogens and testing has shown it to have low toxicity. It should be noted, however, that these alternatives tend to be more corrosive to metal fasteners than CCA. Hot-dipped galvanized or stainless steel fasteners should be used with ACQ or CBA-treated wood.¹⁰**
- **Although ACQ, CBA and composite lumber are much less toxic than CCA lumber, they all have some environmental and/or structural disadvantages. Thus, a number of other promising alternatives are currently being investigated for their potential candidacy as replacements.**

22. Is there any way to look at CCA lumber surfaces and tell how much arsenic might come off from hand contact?

It may be difficult to visually identify CCA-treated lumber. Freshly treated CCA wood, if not coated, has a greenish tint which fades over time. Avoid streaks of green crystalline salt, which is most likely pure CCA and is very dangerous. The green color is due to the presence of copper and indicates that the wood is treated.

NOTE! Wood treated with the alternative non-arsenic copper-based preservatives can have the same greenish tinge as CCA-treated wood. These alternative preservatives only began to be commonly available in the U.S. in mid-2002 and did not completely replace CCA until early 2004.

- **If you don't know if a structure is made of CCA wood, try contacting the manufacturer or builder. Generally, CCA has been the main chemical used to treat wood for decks and other outdoor uses for homes. If the structure was not built with a naturally decay-resistant wood such as redwood or cedar, CCA wood was probably used.**

- **IF YOU ARE UNSURE, YOU SHOULD TEST YOUR STRUCTURE FOR ARSENIC.** It is difficult to determine potential arsenic exposure without an actual wipe test. See Questions 9 and 10 for information about home arsenic test kits.

23. What about disposal of CCA lumber?

Due to a special exemption in hazardous waste classification, ordinary landfills are permitted to accept CCA lumber. However, leaching from these landfills is elevating arsenic levels in the environment¹¹. **CCA wood should go to a hazardous waste disposal area or to a lined municipal landfill where it will be stored and segregated from other recyclable lumber.**

Disposal Precautions: Do not cut CCA lumber into smaller pieces before disposal because of the resulting arsenic-laden sawdust. Arsenic is an even more powerful carcinogen when inhaled than when ingested, and the creation of sawdust increases the likelihood of inhalation.

In addition, never burn CCA wood or send it to an incinerator since this releases the arsenic in the form of a toxic gas and there is arsenic throughout the resulting ash, which is highly toxic.

See Question 15 for other important handling precautions.

24. Will CCA lumber used for docks cause arsenic contamination of surrounding water, and is the arsenic taken up by fish?

CCA lumber used for docks and other submerged structures does appear to contaminate surrounding water with arsenic, chromium, and copper, and it has been shown that the arsenic is taken up into fish tissue and other aquatic organisms. The amount of arsenic contamination that occurs in a water body with many CCA lumber docks on it will depend greatly on the flushing rate of the water levels. In a small stagnant pond, arsenic levels could get relatively high, while in a tidal estuary they would never build up due to constant flushing.

As for the alternative copper-based preservatives such as ACQ and CBA, the toxicity of copper to some beneficial marine organisms presents problems for the use of these preservatives in marine applications¹².

