

TerranearPMC Safety Share

Week of August 15, 2016 – Arsenic-Treated Wood

Recently, I was involved on a project where a client conveyed a concern regarding arsenic-contaminated soils. While, in the past, our customer had conducted work where an assortment of contaminants were used, there was no historical information that would suggest that arsenic was associated with any past industrial processes at their facility. Yet environmental laboratory analysis verified elevated levels of arsenic was present in the soils.

So where was arsenic coming from? The fact is, arsenic is an element and therefore, found throughout the world's soils, ranging from 1 – 40 milligrams per kilogram (mg/kg), with the average being about 5 mg/kg. Because laboratory analysis indicated arsenic soil concentrations in excess of 70 mg/kg, it was clear that contaminant levels were due to something other than nature.

After examining the site for potential arsenic sources, it was noted that the site perimeter was made of chain-linked fence that was supported by large wood posts which resembled railroad ties. In addition, these wood posts were also used around the site for landscaping. There was our answer! These posts had to have been treated with arsenic or arsenic compounds as a method to preserve the wood. The fact is there are a number of chemical preservatives and processes that are designed to extend the life of wood by increasing the durability and resistance from being destroyed by insects or fungus; a process known as timber treatment, lumber treatment or pressure treatment. All we had to do was test our theory by collecting samples of the wood posts for laboratory analysis. Sure enough, arsenic concentrations in excess of 3000 mg/kg were identified.

Pressure treating is a chemical process that helps wood withstand the elements and wards off insects, microorganisms and fungal decay. During the pressure treating process, wood is saturated with chemical solutions (containing arsenic). The wood takes several months to dry and there may be some shrinkage and warping as a result.

Wood structures (excluding cedar or redwood) built prior to 2004, are most likely constructed with pressure-treated wood. The typical chemical compound used is Chromated Copper Arsenate, often referred to as CCA which is a pesticide.

CCA, like other pesticides, is registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) by the U.S. Environmental Protection Agency (EPA). In 2001, the U.S. Consumer Product Safety Commission (CPSC) and the EPA received several petitions to ban CCA use in playground equipment.

Treating wood for the purpose of a preservative is not a new concept. Far from it! There are records of wood preservation reaching back to ancient Greece during Alexander the Great's rule, where wood used in bridge construction was soaked in olive oil. The Romans protected their ship hulls by brushing wood with tar. During the Industrial Revolution wood preservation became a cornerstone of the wood processing industry. Commercial pressure treatment began in the latter half of the 19th century with the protection of railroad crossties using creosote (carbonaceous chemicals collected from tar distillation).

Although a ban on CCA-treated wood was never imposed, there were voluntary cancellations on wood intended for outdoor residential structures such as decks and playgrounds. The voluntary cancellations did not address the potential exposure to chemical residues from existing CCA-wood structures, nor does the EPA require the removal of structures made with CCA-treated wood. Wood treated with CCA is still available primarily for industrial use, and CCA is also still registered with EPA for the treatment of wood



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products that may be found in residential settings (shakes, shingles, and structural members other than decks) as well as products found in agricultural/commercial settings (posts or sawn timbers for fence posts or structural supports)

Once it was determined that our site contained arsenic-contaminated soils, remediation activities needed to proceed. This meant protecting our workers from potential arsenic exposure. Arsenic is a poison and has been used throughout history as a clandestine political tool due to its lack of color, odor, and taste, thereby making it a favored poison; especially during ancient Rome. The immediate symptoms of *acute* (short-term) arsenic poisoning include vomiting, abdominal pain and diarrhea. These are followed by numbness and tingling of the extremities, muscle cramping and death (obviously this last symptom involves substantial intake – the LD50 for arsenic is 15 milligrams per kilogram of body weight). Chronic (long-term exposure) health effects associated with arsenic exposure include neurotoxicity, diabetes, pulmonary disease and cardiovascular disease. Arsenic exposure has been linked to “blackfoot disease”, which is a severe disease of blood vessels leading to gangrene. Arsenic is also associated with adverse pregnancy outcomes and infant mortality, with impacts on child health, including evidence of negative impacts on cognitive development. The International Agency for Research on Cancer (IARC) has classified arsenic and arsenic compounds as carcinogenic to humans (which includes arsenic in drinking-water).

While studies show that the chemicals from CCA-treated wood can leach into the environment (soils, water, etc), the amount and rate of leaching varies and is dependent on factors such as climate, rain/soil acidity, and wood age. Discarded CCA lumber can usually be disposed of in construction and demolition landfills, municipal solid waste landfills, or industrial nonhazardous waste landfills; however, state or local laws may be more stringent. Be sure to contact your state or local authorities for information on disposal of CCA-treated wood.

Below are some important practices to protect yourself (and others) from a potential chemical exposure from CCA-treated wood.

- Do not burn CCA or other preservative-treated wood to avoid possible inhalation of toxic chemicals in the smoke and ash
- Wear personal protective equipment such as goggles and gloves when sawing, cleaning, or handling CCA-treated wood.
- Thoroughly wash hands and all exposed body parts with soap and water after handling or playing on CCA-treated products.
- Launder clothing worn when handling CCA-treated wood separately.
- Children should not eat while on CCA-treated playgrounds as arsenic may be transferred to the mouth.
- Never use treated wood in areas where it may come into direct or indirect contact with drinking water.
- Do not apply harsh cleaning products such as bleach, sodium hydroxide, sodium percarbonate, oxalic acid, and citric acid to CCA-treated wood.
- Avoid sanding or power washing CCA-treated wood.
- Regular application of an oil or water-based penetrating coating (stains, sealants) to CCA-treated wood structures may reduce potential exposure to chemical residues.

It is better to fail in originality than to succeed in imitation.

Herman Melville

