

Hazardous Waste Characterization of Preservative Treated Wood

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Introduction

Arsenic-based wood preservatives have been phased out because of concerns over the toxicity of these compounds. Alternative pressure treatment preservatives include Copper Azole (CA-B) and Alkaline Copper Quaternary (ACQ). However, copper is regulated by the State of California as a Persistent and Bioaccumulative Toxic Substance. Wastes exceeding the regulatory levels for total or soluble copper must be managed in accordance with the California Hazardous Waste Control Act (e.g. cannot be disposed in a municipal landfill) unless the Department of Toxic Substances Control (DTSC) adopts Alternative Management Standards (AMS) that are protective of human health and the environment.

So that DTSC can develop AMS regulations, it is evaluating treated wood waste using laboratory methods for hazardous waste testing specified by the California Code of Regulations, Title 22, Sec. 66261.24, "Characteristic of Toxicity." These are an acid digestion for total metals, the California Waste Extraction Test for soluble metals, and a 96-hour acute aquatic bioassay.

Methods and Materials

Twenty new CA-B and ACQ treated 2x8s were obtained from lumberyards statewide. Sections (approx 0.25" wide) were sawn from the interior of the boards. One section (quartered) from each of the 20 boards comprised a replicate; four such composites were prepared for each species/preservative combination and for untreated boards.

The wood samples were ground in a laboratory mill to pass through a 2mm sieve. Before use and after each composite replicate, the mill was cleaned by mechanical means and acetone. A mill blank was then ground using untreated Douglas fir to check for carry-over between replicates. Each milled composite replicate was sub sampled for total and soluble metals analysis, and for 96-hour acute aquatic bioassay which was done at Associated Laboratories (Orange, CA) using fathead minnows (*Pimephales promelas*).

For total metals determination, the milled wood samples were digested using nitric and hydrochloric acids, hydrogen peroxide, and heat (EPA Method 3050B). Samples were also extracted using the 48-hour Waste Extraction Test (WET), which uses 0.2M citrate buffer (pH 5) to simulate conditions in a municipal landfill. Acid digests and WET extracts were analyzed by ICP-OES.

Results

Preservative Treated Wood Total Copper

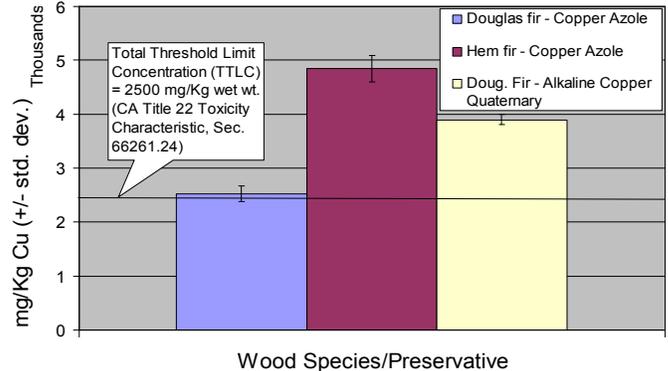


Figure 1. Total Copper in Treated Wood

Preservative Treated Wood CA Waste Extraction Test (WET)

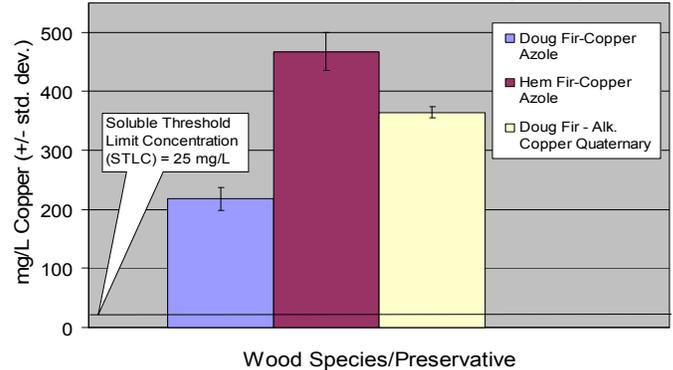
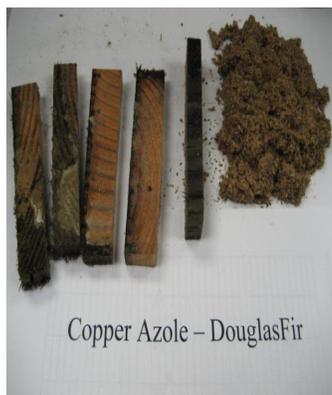


Figure 2. Soluble Copper in Treated Wood

Douglas fir Control	Douglas fir Copper Azole	Hem fir Copper Azole	Douglas fir Alk. Copper Quaternary
> 750 mg/L	> 750 mg/L	< 250 mg/L	> 750 mg/L

Table 1. Acute Aquatic Bioassay 96-hr LC50 (Reg. Level < 500 mg/L)



Conclusions

1. All wood preservative treatments/species exceeded the California hazardous waste toxicity criteria for total and soluble copper.
2. Copper azole treated Hem-fir exceeded the LC50 toxicity criteria.
3. Preservative concentration (retention) expressed as copper varied among treatments and species.
4. The next phase of this study will examine used creosote treated railroad ties for toxic organic compounds, including total and leachable dioxins and phenolics.