RESEARCH in Progress

Coalition for Advanced Wood Structures
a university, industry, government partnership

Remediating Treated Wood

Chromated copper arsenate (CCA) has been the most commonly used wood preservative in North America for the past 30 years. As a result, large volumes of CCA-treated waste have entered our landfills as treated wood has been removed from service. Recent voluntary withdrawal of CCA from most residential applications has led to a new generation of copper–organic wood preservatives replacing CCA for residential applications. As a result, treated wood containing copper will continue to accumulate in landfills and may face increased environmental scrutiny in the future. Although many methods for recycling and reuse of treated waste wood have been developed, none has been readily adopted because of inherent costs and lack of means to handle, transport, sort, and process the waste material. Putting bioremediation of treated wood into practice would divert this fiber source from our landfills, thereby reducing concerns about groundwater contamination and providing tangible secondary products from remediated wood fiber.

CCA-treated wood flakes prior to pilot-scale remediation.

Background

Bioremediation is a process that utilizes microorganisms to degrade or remove hazardous components of a waste from the environment. For bioremediation of treated wood, using metal-tolerant bacteria has obvious advantages over using metal-tolerant fungi. Unlike fungi, bacteria cause no structural damage to wood fiber during remediation, so the separation of preservative chemicals from wood would allow reuse of both the chemicals and the cleaned wood fiber in secondary applications.

Objectives

The objective of this research is to evaluate the ability of a copper-tolerant bacterium to remove copper-based wood preservatives from treated aspen and compare results with those of chemical remediation (solublization).

Approach

Studies on bioremediation of CCA-treated particles, chips, and flakes showed that flaked wood is the most easily remediated wood geometry because of its large surface-to-volume ratio. Flaked aspen treated with copper azole or ammoniacal copper quat type D (ACQD) will be exposed to the bacterium under various conditions to assess the ability of the bacterium to remove copper from the wood. Different treatment groups will be analyzed for residual cooper.

Expected Outcomes

Assessing the effectiveness of copper-tolerant bacteria at removing copper-based preservatives will help us understand the consequences of landfilling large volumes of wood treated with copper-based preservatives, including new formulations that do not rely on chromium as a fixative to the wood. We hope to transfer bioremediation technology into the marketplace in the event domestic landfill restrictions on treated wood, similar to those in other countries, are imposed in the future.

Advanced Housing Research Center
Forest Products Laboratory
Madison, Wisconsin

USDA

U. S. Department of Agriculture
Forest Service • Forest Products Laboratory
www.fpl.fs.fed.us

Remediated wood flakes with 83 to 95 percent of CCA components removed

Timeline

- Isolate and identify metal-tolerant bacteria, 1996–2000
- Define cultural characteristic of selected isolates, 1997
- Develop bioremediation protocol, 1998
- Develop dual-treatment remediation method for CCA-treated wood, 2000
- Reassemble remediated wood into composites, 2000–2006
- Improve economics with alternative nutrients, 2002–2004
- Pilot scale-up, 2004–2006
- Evaluate potential to remediate ACQD and copper azole, 2007

Contact Information

Carol A. Clausen
USDA Forest Service
Forest Products Laboratory
Madison, Wisconsin
(608) 231-9253, cclausen@fs.fed.us