

Document No: IRG/ 95-50042

THE INTERNATIONAL RESEARCH GROUP ON WOOD PRESERVATION

SECTION 5

ENVIRONMENTAL ASPECTS

**CURRENT AND FUTURE OPTIONS FOR MANAGING
USED PRESERVATIVE-TREATED WOOD**

By

Rodney C. De Groot
Colin Felton

USDA Forest Service
Forest Products Laboratory
Madison, Wisconsin
U.S.A.

Paper prepared for 26th Annual Meeting
Helsingør, Denmark
11-16 June 1995

IRG Secretariat
Box 5607
S-114 Stockholm
Sweden

Abstract

The amount of preservative-treated wood available for disposal will continue to increase exponentially in the next several decades as landfill availability declines. At the same time, recent legal ruling on competitiveness among utilities and disposal of ash has clouded the economic outlook for combustion of treated wood for energy recovery. This report identifies current and future options for managing used preservative-treated wood, as well as technological and environmental/regulatory limitations to these options. Re-use, recycling (particularly through the manufacture of wood-based composites), and biodegradation are described as primary alternatives to land disposal and combustion. The report also describes supporting technologies (analytical methods and comminution) for managing used treated wood.

Introduction

In the context of materials being considered for recycling, material identified as treated or contaminated sometimes includes all wood that has been treated or chemically changed in some way, including surface coating (paint), manufacture with glues and binders, and impregnation with preservatives. For the purpose of this review and analysis, *treated wood* refers to only wood that has been treated with wood preservatives. This includes both surface applications of preservatives and in-depth treatments, i.e., impregnation with wood-preservative chemicals.

Common wood products containing nonwood materials that account for the majority of available wood waste are painted woods, wood panel products (containing glues and binders), pallets and shipping containers (having surface treatments and contaminants), and products treated with preservatives, such as poles, railroad ties, and decking. Used preservative-treated solid-wood products offer a sizable resource for recycling programs. However, as a resource, these products are encumbered with several environmental and public health concerns that do not encumber used untreated solid-wood products. Consequently, preservative-treated materials are not included in the recycling technologies being developed for untreated wood within the United States. This matter is of growing national concern because large volumes of treated wood are produced annually. Large-volume products such as utility poles and railroad ties, which have traditionally been treated with preservatives, are being continually removed from service. In addition, an increasing volume of construction lumber and timber is being treated. For example, over half of all Southern Pine lumber is treated with preservatives.

At present, the primary options for redeploying used treated wood products are reuse, disposal by landfill, and combustion with energy recovery. Options for reusing treated products in a manner consistent with their original purpose are somewhat restricted by product and locale. The availability of landfills is declining, and recent legal rulings on competitiveness among utilities and on ash disposal have clouded the economic outlook for combustion with energy recovery.

Additional options are definitely needed for managing used treated wood. Such options can be envisioned with the development or expansion of additional technologies, but no single-step solution will resolve all concerns.

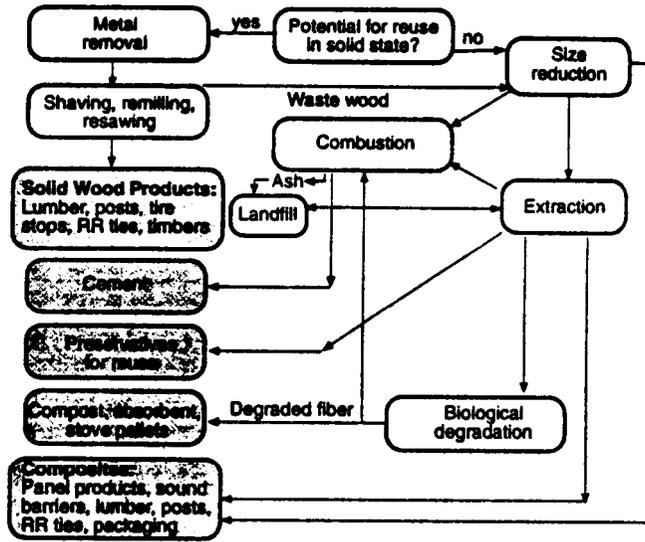


Figure 1. Overall view of options for reusing used treated wood.

Options for Managing Used Treated Wood

An overall view of approaches for recycling preservative-treated wood is shown in Figure 1.

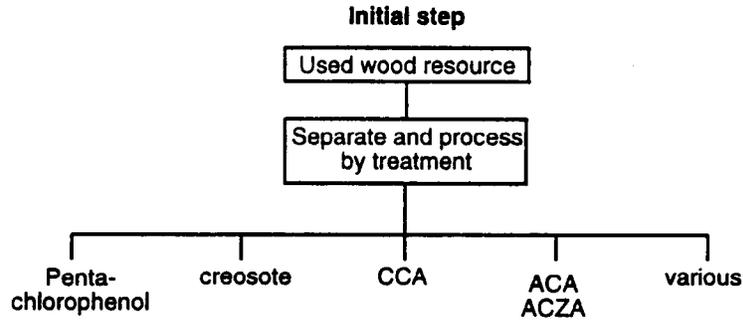
Most wood in packaging, pallets, joinery, and truck beds that has been treated with preservative has been surface-treated with pentachlorophenol or copper naphthenate. Recently treated (after 1990) wood in these commodities may have been surface-treated with a metal-organic system, such as zinc naphthenate, copper-8-quinolinolate, or one of the more recently developed organic preservative systems. Some wood packaging may also have been pressure-treated with a waterborne system.

Virtually all railroad ties have been pressure-treated with creosote. Utility poles installed prior to 1985 have probably been treated with creosote, pentachlorophenol, or an ammoniacal waterborne preservative. Poles installed more recently may also have been treated with either chromated copper arsenate (CCA) or copper naphthenate.

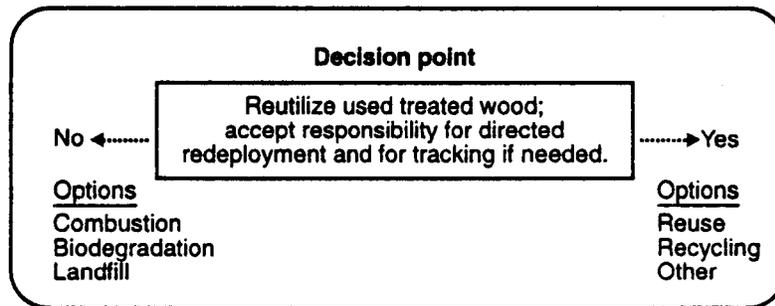
Construction lumber may have been treated with creosote, pentachlorophenol, or any of several waterborne, inorganic wood preservatives. Most treated lumber acquired after 1980 would have been treated with inorganic arsenical compounds.

Reuse Versus Termination

Because of the unique environmental and processing concerns associated with individual treatments, recycling programs for used treated wood products must be designed not by commodity but for each specific type of chemical treatment.



For products within each treatment category, the critical programmatic determination will be whether to promote continued utilization of the wood fiber with attendant technical and administrative challenges or to revert the product to its component minerals and carbon dioxide (i.e., destroy or terminate the product). Because environmental perceptions and real conditions vary so much throughout the world and within the United States, either decision would be applauded in some locales and disputed in others.



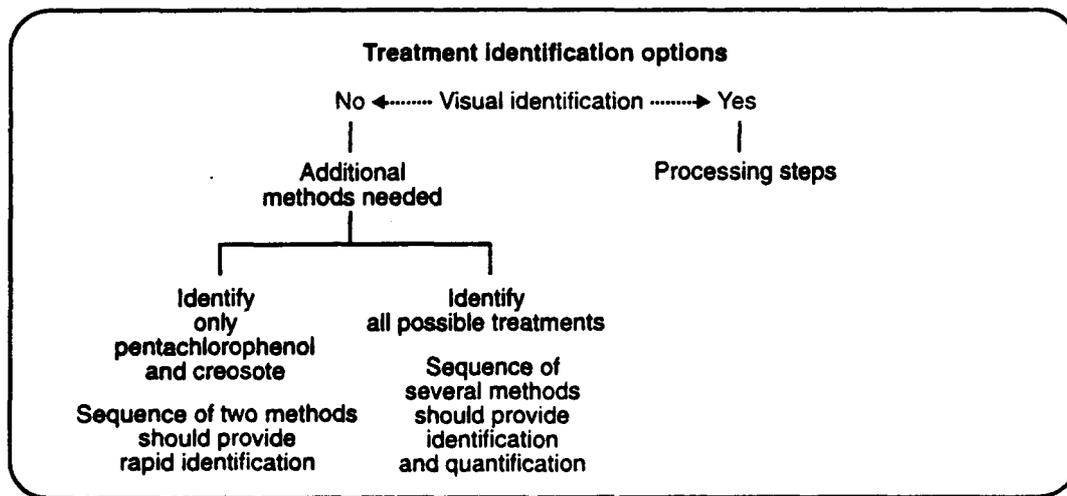
Technologies probably can be developed to support either option. When the decision is made to reuse treated wood products, several intertwining management policies, criteria, and regulations contingent on the nation, State, or local region may come into play. Critical attention must be given to all pertinent administrative requirements in developing programs for managing used treated wood products.

Supporting Technologies

Technologies for managing used treated wood include analytical methods and comminution. Programs must take into account Federal regulations for reusing treated wood.

Analytical Methods

Additional analytical chemical methodology needs to be developed for rapidly and accurately identifying materials in the field that cannot be identified visually. Such an identification protocol can be developed to identify all possible treatments with assurance or to distinguish only pentachlorophenol and creosote from the mix.



Comminution

Comminution, the process of reducing wood to smaller units, is a component step in all processes, except landfill. Specific activities range from sawing large members into sections for an industrial combustor to converting solid wood to fibers. The mechanics of comminution are well understood, but other processing concerns block exploration of recycling options for used treated wood products. All comminution procedures are accompanied by site-related environmental concerns (air, soil, and water) and health concerns (worker exposure). Resolution of these concerns to the extent required by pertinent regulations will be a necessary step in advancing conceptual technologies for recycling treated wood products to the level of industrial acceptance.

Regulations

The reutilization and disposal of treated wood products may be regulated by many levels of government. Therefore, management programs for used treated wood products must address regulations at various governmental levels.

Used treated wood products that are reused in somewhat the same form as the original products and in a manner compatible with their original intended purpose are usually not considered waste. Treated wood removed from service or generated as construction waste with no other useful application as a product is considered a solid waste. Comminuted treated wood, such as that produced by chipping, grinding, or shredding, is generally regulated as a form of solid waste.

Treated wood waste is not considered hazardous waste at the Federal level, but it may be classified as such at lower echelons of government. Hazardous waste is classified by the Federal government on the basis of its toxicity, flammability, or corrosivity characteristics. The toxic characteristic leaching procedure (TCLP), which evaluates a waste's potential for leaching of hazardous compounds, is used to determine if a waste is toxic enough to be classified as hazardous.

Pentachlorophenol- and creosote-treated wood generally passes the TCLP test (EPRI 1991, Goodrich-Mahoney 1994). The test exclusions for chromium and arsenic prevent CCA-treated wood from being classified as hazardous waste. If waste wood is classified as hazardous and landfilled, it must be disposed of in hazardous waste (class I) landfills, which are significantly more expensive than other types of landfills. The wood must also be transported as hazardous waste by haulers approved to handle such waste.

The following Federal identification criteria and exemptions apply to inorganically treated wood that contains chromium and arsenic.

40 CFR Part 261 - Identification and Listing of Hazardous Waste

Subpart C - Characteristics of Hazardous Waste

261.20 A solid waste, which is not excluded from regulation as a hazardous waste under 261.4(b), is a hazardous waste if it exhibits any of the characteristics identified in this subpart.

261.22 Characteristic of Toxicity

(a) A solid waste exhibits the characteristic of toxicity if, using the test methods described in appendix II (TCLP) or equivalent methods approved by the Administrator under the procedures set forth in 260.20 and 260.21, the extract from a representative sample of the waste contains any of the contaminants listed in Table 1 at the concentration equal to or greater than the respective value given in that table.

261.4 Exclusions

- (a) Materials which are not solid wastes:
- (9)(i) Spent wood preserving solutions that have been reclaimed and are reused for their original intended purpose; and
 - (ii) waste water from the wood preserving process that has been reclaimed and reused to treat wood.

Table 1. TCLP limits

Compound	Federal regulatory level (mg L⁻¹)
arsenic	5.0
chromium	5.0
o-cresol	200
p-cresol	200
cresol (if not specific)	200
pentachlorophenol	100
2,4,5 trichlorophenol	400
2,4,6 trichlorophenol	2.0

(b) Solid wastes which are not hazardous wastes:

(4) Fly ash waste, bottom ash waste, slag waste and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels, except as provided by 266.112 of this chapter for facilities that burn or process hazardous waste.

(6)(i) Wastes which fail the test for the Toxicity Characteristic because chromium is present or are listed in subpart D due to the presence of chromium, which do not fail the test for the Toxicity Characteristic for any other constituent or are not listed due to the presence of any other constituent, and which do not fail the test for any other characteristic, if it is shown by a waste generator or by the waste generators that: (A) The chromium in the waste is exclusively (or near exclusively) trivalent chromium; and; (B) The waste is generated from an industrial process which uses trivalent chromium exclusively (or near exclusively) and the process does not generate hexavalent chromium; and (C) The waste is typically and frequently managed in non-oxidizing environments

(9) Solid waste which consists of discarded wood or wood products which fails the test for the Toxicity Characteristic solely for arsenic and which is not a hazardous waste for any other reason or reasons, if the waste is generated by persons who utilize the arsenical-treated wood and wood products for these materials' intended end use.

Although most states have regulations that mirror Federal regulations on hazardous waste and classification, in some states the regulations are significantly more stringent and restrictive. For example, California uses total threshold limit concentration (TTLC) and soluble threshold limit concentration (STLC) tests to determine the toxicity characteristic of the waste. In addition, California does not exempt arsenically treated wood from hazardous waste regulations [22 CCR 66261.4(b) (3)]. Also, California's health and safety code (H&SC) 25143.2(b) indicates that treated wood that is managed for reuse is excluded from classification as hazardous waste, The exemption [H&SC 25143.2(e)] excludes treated wood waste that is burned for energy recovery, speculatively accumulated, or reused or recycled in a manner that constitutes disposal or in a manner that is inconsistent with the use of the preservative.

References

EPRI. 1991. Pentachlorophenol-treated wood poles and cross-arms: Toxicity characteristic leaching procedure results. Report summary EN 7062s, Electric Power Research Institute, Palo Alto, CA.

Goodrich–Mahoney, J., Murarka, I., Holcombe, L., and Horn, M. 1994. Pentachlorophenol-treated wood poles and crossarms: Toxicity characteristic leaching procedure results. *In* Environmental considerations in the manufacture, use and disposal for preservative-treated wood, Forest Products Society, Madison, WI, 58–65.

Acknowledgments

This project was supported, in part, by the U.S. Army, Packaging Division, ARDEC, Picatinny Arsenal, New Jersey, MPR WI5BW940107.

