Selection and Safe Use of Chemical Wood Protection

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IASC Inter-Agency Standing Committee
HAITI SHELTER CLUSTER

INTRODUCTION

Types of wood preservatives found in market

Water based preservatives

1. Chromated copper arsenates (CCA)
2. Alkeline copper quaternary
3. Copper azole
4. Micronized copper
5. Borate preservatives
6. Sodium silicate base preservatives
7. Bifenthrin spray preservatives

Organic solvent based Preservatives

1. Cole-tar creosote
2. Linseed Oil
3. Light organic solvent preservatives (LOSP)
4. Pentachlorophenol

The best way to protect wood is through correct design by minimizing the exposure to moisture. Properly seasoned wood is less prone to insect or fungal attacks. However in humanitarian shelter work, especially in the emergency and transitional stages, soft woods are used more often and possibilities of maintaining proper low moisture conditions are challenging. Therefore wood treatment can become imperative where long/medium term wooden structures are required.

There are mainly two methods of wood treatment.

1. Heat treatment
2. Chemical treatment

Heat treatment is a method where the internal structure of a timber is altered by heat without using chemicals, making it less susceptible to pest attack. Generally heat treatment is expensive and only used in large industrial applications. Chemical treatment is more widely used and also suitable for onsite applications.

Most of the above preservatives are commonly used in varied degrees in the different parts of the world. Water based preservatives are commonly preferred over solvent based ones due to low cost. Both water and solvent based preservatives carry toxicity hazards. Water bone preservatives are mostly heavy metal based and less preferred in countries with strict standards on heavy metal contents, where as solvent based preservatives are restricted in countries with strict Volatile Organic Compound (VOC) controls. Natural preservatives such as Linseed oil are less toxic, however they are less effective and costly compared to artificial/chemical preservatives.

Method of application

Chemical wood protection can be applied in following methods;

1. Onsite application with brushes
2. Onsite application by dipping
3. Pretreatment of wood with surface application or pressure impregnation at the factory

Using pre-treated wood is preferred when risk of onsite contamination due to spilling and disposal of empty containers are considered. However pre-treated timber would not be free of risk of contamination due to leaching of active compounds if the wood is exposed moisture. Risk of hazards due to direct human contact with timber is also common to both methods. Onsite application is economical for smaller volumes of timber whereas pre-treatment become cost effective in large scale procurements.

USAGE AND RISKS

Usage and risks of different preservatives

Please refer table 1

Examples for certifications and standard specifications available for Wood Preservatives & Chemicals

1. Product Certification : American Wood Protection Association (AWPA) : www.awpa.com; Environmentally Preferred Product (EPP) certification awarded by Scientific Certification Systems (SCS) : www.scscertified.com
2. Production systems certifications and voluntary good practice initiatives: ISO 14000; Responsible Care® (www.responsiblecare.org)

GENERAL RECOMMENDATIONS FOR WOOD PRESERVATIVE USE IN T-SHELTER CONSTRUCTION

There are many restrictions and controls practiced over the use and application of wood preservatives that vary across different countries and regions of the world. In addition to the actual risk involved with a chemical, these restrictions may be related to availability and cost factors of that chemical in a given country or region. Therefore in a complex situation such as the Haiti earthquake response, where timber and chemicals may be sourced from a multitude of sources and countries, it will be difficult to maintain a single standard or guideline for procurement or use of wood preservatives.

The Rapid Environmental Assessment done after the earthquake in Haiti by CHF and USAID [1] recommends not to use any kind of chemical treatment for timber used in T-shelter construction because of the extra environmental and health hazards associated with treatment. However, given the complex nature of the shelter needs and unfavorable environmental conditions, use of chemical wood protection might be imperative in some sites. Following are the guidelines recommended for selection and safe use of chemical wood protection in transitional shelter projects. They are listed in the order of preference in an Environment; Health and Safety (EHS) perspective;

1. Avoid use of chemical wood protection where it is not absolutely essential
2. Chromated Copper Arsanate (CCA) and Pentachlorophenol based preservatives are increasingly removed from use in many countries. Especially in USA, CCA based products are not manufactured from 2003 (www.**epa.gov**/oppad001/reregistration/**cca**). Many humanitarian timber guidelines also discourage the use of CCA [2,3]. Therefore strictly avoid using CCA or Pentachlorophenol based preservatives for onsite applications and also avoid purchase of timber/plywood pre-treated with above chemicals.
3. Given the higher risks of contamination involved in on-site application of wood preservatives, use of pre-treated timber should be preferred over on-site application.
4. Where onsite application is needed, care should be taken to safely dispose the empty chemical containers treating them as a hazardous waste.
5. Charcoal being the most popular household fuel in Haiti, it is highly possible that wood cut-offs from T-shelter construction sites will be used for charcoal burning or direct use in stoves for cooking. Considering the possible hazards of most chemicals found in wood preservatives, the implementation agencies should strictly refrain from making the wood-cutoffs available for IDPs as a cooking fuel.
6. The chemically treated wood cut-offs should be treated as hazardous waste and disposed in a place safely out of the reach of people as much as possible. Wood cut-offs should not be disposed in waterways, wetlands or high groundwater areas. Burning of wood cut-offs in densely populated areas should be strictly avoided.
7. It is also essential that implementation agencies educate the construction workers and IDPs (where necessary) on health related hazards of construction chemicals (i.e.: Wood preservatives, Termite treatment chemicals, Chemically treated wood, used paint and chemical cans, exposure to Volatile Organic Compounds).

References

1. C. Kelly, S Solberg. (2010) Rapid Environmental Impact Assessment: Haiti Earthquake, CHF, SMTN and USAID
2. I de Muyser-Boucher, G Saunders and E Babister (2009) Timber as a construction material in humanitarian operations
3. J Fowler & J Ashmore (2006). Internal Guideline :Timber Procurement & Specifications December, NRC (www.nrc.no)

Table 01: Technical details on different wood preservative type

Type of Preservative	Geographical distribution of usage		Advantages	Demerits/Risks
	Popular in	Restricted in		
Water based preservatives (Mainly used in dipping and pressure treatment, some are possible to be brush applied)				
Chromated copper arsenates (CCA)	Used in some developing countries without restriction	Strictly controlled in USA, Europe and Australia	Low cost, anti corrosive	Contains Arsenic, Chromium and Copper; As and Cr are known to be toxic and carcinogenic
Alkeline copper quaternary	USA	-	Accepted as health & environment friendly	Highly increases the corrosion of the metal accessories in contact with wood
Copper azole	USA, Europe	-	Accepted as health & environment friendly. Effective in smaller quantities	Moderately increases the corrosion of the metal accessories in contact with wood
Micronized copper	USA , Europe	-	Accepted as health & environment friendly.	-
Borate preservatives	Throughout the world	Some countries discourage use	Low cost	Borate is leachable after application and may contaminate water and soil. Copper Chrome Boron (CCB) leaches less. But more toxic.
Sodium silicate based preservatives	Traditional technology practiced around the world	-	-	Easily washed away. Low penetrability. Not used in Large commercial applications
Bifenthrin spray preservatives	Australia	-	-	Low penetrability
Organic solvent based preservatives or Oil based preservatives (Mainly brush applied, occasionally used in dipping and pressure treatment)				
Cole-tar creosote	Throughout the world	-	Useful in large rough application such as rail-road sleepers	Not suitable for valuable woods or internal applications. Highly toxic as a pigment.
Linseed Oil	New Zealand and Australia Similar natural oils used in Europe	-	Natural product	Mainly effective as a water repellant than actual biological action
Light organic solvent preservatives (LOSP)	New Zealand and Australia	Europe	Clear non-viscous liquid that leaves no stains or shine on wood	Contains Volatile organic Compounds
Pentachloropenol	-	-	-	Can be highly toxic , normally used in pressure treatment