Selection and Safe Use of Chemical Wood Protection

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INTRODUCTION

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

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-cut-offs 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
2. I de Muyser-Boucher, G Saunders and E Babister (2009) Timber as a construction material in humanitarian operations
# Table 01: Technical details on different wood preservative type

<table>
<thead>
<tr>
<th>Type of Preservative</th>
<th>Geographical distribution of usage</th>
<th>Advantages</th>
<th>Demerits/Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water based preservatives (Mainly used in dipping and pressure treatment, some are possible to be brush applied)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromated copper arsenates (CCA)</td>
<td>Used in some developing countries without restriction</td>
<td>Strictly controlled in USA, Europe and Australia</td>
<td>Low cost, anti corrosive</td>
</tr>
<tr>
<td>Alkeline copper quaternary</td>
<td>USA</td>
<td>-</td>
<td>Accepted as health &amp; environment friendly</td>
</tr>
<tr>
<td>Copper azole</td>
<td>USA, Europe</td>
<td>-</td>
<td>Accepted as health &amp; environment friendly. Effective in smaller quantities</td>
</tr>
<tr>
<td>Micronized copper</td>
<td>USA, Europe</td>
<td>-</td>
<td>Accepted as health &amp; environment friendly.</td>
</tr>
<tr>
<td>Borate preservatives</td>
<td>Throughout the world</td>
<td>Some countries discourage use</td>
<td>Low cost</td>
</tr>
<tr>
<td>Sodium silicate based preservatives</td>
<td>Traditional technology practiced around the world</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bifenthrin spray preservatives</td>
<td>Australia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Organic solvent based preservatives or Oil based preservatives (Mainly brush applied, occasionally used in dipping and pressure treatment)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cole-tar creosote</td>
<td>Throughout the world</td>
<td>-</td>
<td>Useful in large rough application such as rail-road sleepers</td>
</tr>
<tr>
<td>Linseed Oil</td>
<td>New Zealand and Australia Similar natural oils used in Europe</td>
<td>-</td>
<td>Natural product</td>
</tr>
<tr>
<td>Light organic solvent preservatives (LOSP)</td>
<td>New Zealand and Australia</td>
<td>Europe</td>
<td>Clear non-viscous liquid that leaves no stains or shine on wood</td>
</tr>
<tr>
<td>Pentachloropenol</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>