



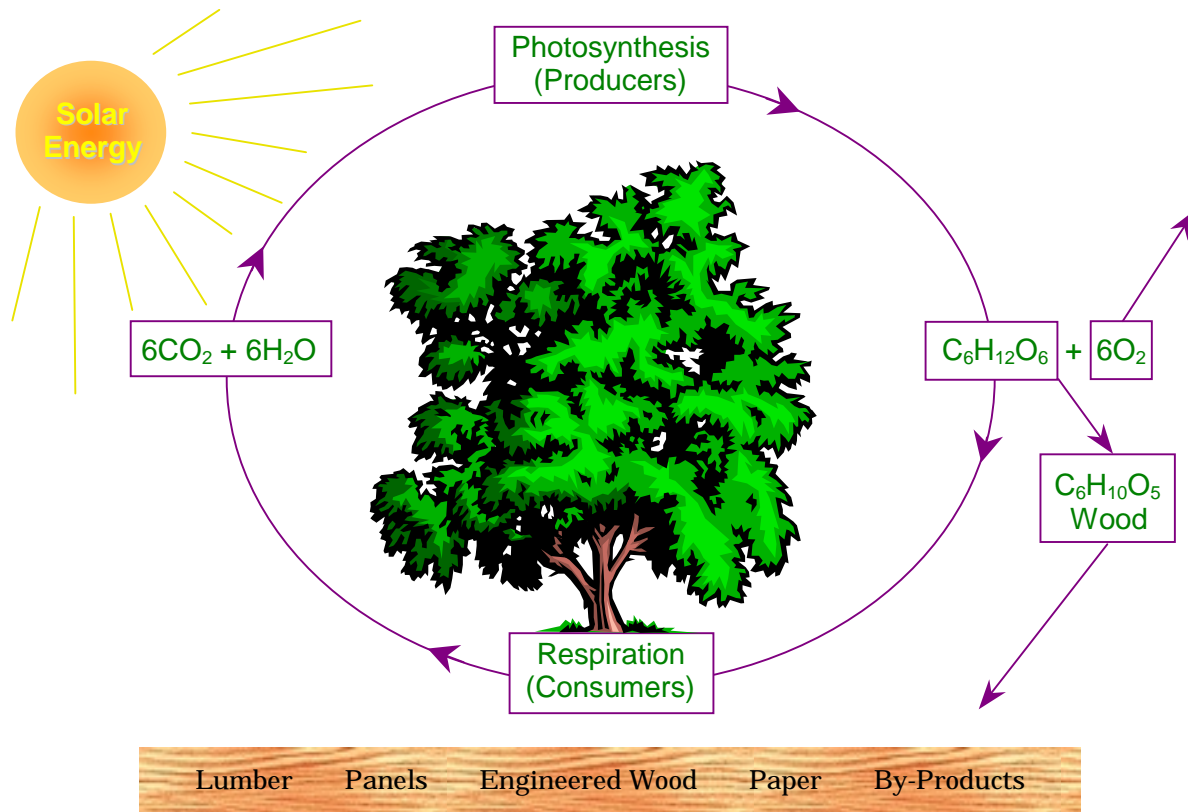
Eco-Link

Linking Social, Economic, and Ecological Issues

Pressure-Treated Wood

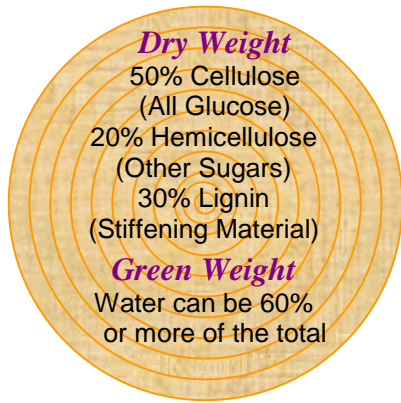
Volume 7, Number 4

As a sustainable society we can use renewables, reduce, reuse, recycle, and extend the life of goods in use. With 6 billion people on the planet, our mission is clear. We have to figure out how to live sustainably by producing more with less: less raw material input, less waste, and less pollution. However, an often overlooked aspect of sustainability is the need to maximize our use of durable goods and to extend their useful life. New technologies allow us all to be “preservationists” in a most positive sense.



Wood is our only self-generating (renewable) building material. It's at the same time extremely energy efficient, strong for its weight, easily cut and shaped, beautiful, and easy to treat, stain, varnish, or paint. If kept dry and protected from insects, fungi, and weather, it's also very durable.

Wood as Food



Many living things (e.g. fungi & insects) use wood as their food source. Given the right circumstances, they can break down the cellulose, hemicellulose, or lignin in the wood cell walls, causing the structure to collapse. Most insects and fungi, like people, are unable to digest cellulose, but a relatively small number of them have this ability. These are the wood



destroyers. Wood preservation is our means of preventing this damage.



The Way It Was

In his book, *American Forests; A history of Resiliency and Recovery*, Douglas W. MacCleery states: "The number of miles of U.S. railroads grew from 10,000 miles to 350,000 miles between 1850 and 1910. Each mile of track required 2,500 crossties.

These were not treated with preservatives until after 1900, so they had to be replaced every 5-7 years. Just replacing railroad ties on a sustained basis required between 15 and 20 million acres of forest land in 1900." !

Wood Preservatives & Carriers

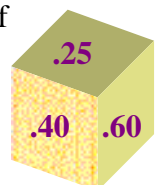
Carrier	Creosote (Tar Oil)	Heavy Petroleum Oil	Water
			Water & Ammonia
Preservative	Creosotes	Penta (PCP)	CCA
			AZCA, ACA, ACQ, CC

There are three broad classes of wood preservatives in use today. Each class has a carrier that acts as the transportation system carrying the preservative into the wood cells. Creosote is unique in acting as both preservative and carrier. Creosote and Penta, or Pentachlorophenol, are used in industrial applications to treat ties, utility poles, posts, pilings, etc. Most construction and home use products are pressure-treated with water-borne preservatives (CCA, ACZA, ACQ, ACA, CC).

Over 50% of all the Southern Yellow Pine lumber produced in the USA is pressure-treated.

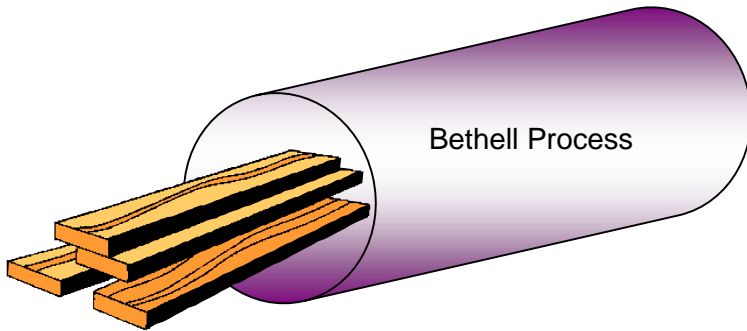
More than 550 million cubic feet of lumber and industrial wood products are treated annually in the United States. Treated wood accounts for approximately 21.5% of the Forest Product Industry's total value of annual shipments. The American Wood Preservers Institute calculates that without treated wood the added costs to America's transportation, construction, and utility industries would exceed \$15 billion per year. More than 10,000 people are directly employed in wood treating plants.

As wood comes into more contact with the ground and water, more preservative is required to provide the needed protection. Your deck may contain .25 pounds of preservative per cubic foot of treated wood, your fence .40 pounds, and a wood foundation or structural timber would have .60 pounds per cubic foot of treated wood.



Pressure-Treating Process

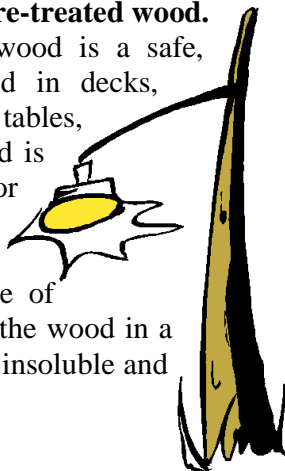
To treat wood, a series of pressure and vacuum cycles force the water-borne preservative deep into the wood cell structure. The treatment process is carefully monitored and controlled within an enclosed cylinder. An initial vacuum removes air from the cylinder and wood, then the preservative is introduced into the cylinder without breaking the vacuum. Next, pressure is applied until the required preservative retention is obtained, as expressed in pounds of preservative per cubic foot of wood. A final vacuum is pulled to remove excess preservative.



Wood exposed to the weather is at the mercy of the sun's heat and ultraviolet rays, rain, ice, wind, dust, and probably bacteria and fungi as well. Outdoor wood can be reasonably protected by putting water repellants into the wood with preservatives at the time of pressure-treatment, or coating the surface of pressure-treated wood with one or two coats of a water repellent liquid. Water repellants can greatly increase the stability of the wood. Many retail outlets now carry pressure-treated wood products with built in water repellants. These water repellants are more effective and longer lasting because they penetrate throughout the sapwood, and are not subject to degradation by ultraviolet light.

Concerns

The American Council on Science and Health has done extensive research on pressure-treated wood. They report that pressure-treated wood is a safe, long-lasting building material used in decks, fences, retaining walls, picnic tables, docks, and other places where wood is exposed to rot, insect attack or biodeterioration. Wood that is treated with CCA is not classified as hazardous because in the course of pressure-treatment, CCA "fixes" to the wood in a way that makes the chemical highly insoluble and leach resistant.



Wood Products treated in accordance with American Wood Preservers Association (AWPA) standards and used within the guidelines of the EPA, are safe for their intended use and pose no threat to people or pets.

Environment

Proper handling and use of preserved wood products poses no increased risk of cancer among human, animal, and marine life.

Scientific data shows that properly produced and installed pressure-treated wood does not aggressively leach chemicals into the ground or waterways, drinking water supplies, or adversely affect marine life.

Preserved-wood products last longer (often 10-20 times longer) than non-treated products, and thereby conserve a renewable natural resource.

Preserved-wood products have been extensively tested and proven to be more reliable and durable than alternative products (metals, plastics, and cements) which require more energy to produce and may be esthetically unacceptable to consumers.

The EPA regulates all wood preservatives as pesticides under the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA).

The Western Wood Preservers Institute has developed Best Management Practices for the use of treated-wood in aquatic environments. BMP treated materials are required by many state, provincial, and federal agencies for use in water and wetland projects.

Health & Safety

Treated wood should only be burned in an approved commercial or industrial co-generation or incinerator facility that is properly permitted to accept the wood.



Wood treated with water-borne preservatives should never be burned in your fireplace or campfire, because combustion breaks the unique bond formed between the preservative and the wood. The components of the preservative can be released in the form of ash particles. Treated wood can be buried or disposed of as ordinary trash.

The safety procedures recommended for treated-wood are the same as those recommended for working with untreated-wood. People should avoid frequent or prolonged inhalation of sawdust. A dust mask should be worn when sawing and machining treated wood.

Serving prepared food on a treated wood picnic table poses no threat.

Summary

As a society we all have choices about the building materials we use and how we treat them. Pressure-treated wood is an excellent option and can provide excellent service for many decades. The predominant preservatives are: Creosote (used primarily for railroad ties and pilings), Pentachlorophanol (an oil-borne preservative used frequently for utility poles), and Chromated Copper Arsenate - CCA (a water-borne solution most commonly used on lumber, plywood, and timbers). These preservatives protect against insects (primarily termites), fungi, and marine borers. Pressure-treating wood is a major component of living sustainably.

Glossary

If it's too good to be through...
Keep it.

ALSC: The American Lumber Standards Committee certifies inspection agencies that treating plants use to conduct frequent quality control inspections.

Arsenic Pentavalent Arsenate: The kind used in wood preservatives, not to be confused with commercially produced Trivalent Arsonic, which is not used in any wood preservative. Pentavalent Arsenate occurs naturally in the soil, water, air, plants, and in most living creatures – including humans.

Cellulose: This is the primary material of wood cell walls and it is 100% non-soluble glucose. It accounts for about 50% of the dry weight of wood. This is a polymer chain carbohydrate (i.e. chains of sugar molecules).

CIS: Consumer Information Sheet, guidelines for handling treated wood, available to the consumer at retail outlets where treated lumber is sold.

Creosote: A distillate derived from the raw material coal tar, which is a by-product of the coking of bituminous coal used in the making of steel.

In 1838 the Bethell process was developed. The application of an initial vacuum followed by the impregnation of creosote formed a basis for the present wood-treating industry.

Decay: Decomposition of wood by wood-destroying fungi.

Extractives: Chemical “wastes” which are stored in the heartwood of trees providing natural durability.

Enzymes: Chemicals that break starch (complex carbohydrates) down to usable glucose. Used by insects and fungi to break down wood.

Fasteners: The hardware (e.g. nails, screws, bolts, joist hangers) used to secure treated wood. Since treated lumber is used for durability, fasteners should be hot-dipped galvanized or stainless steel, especially with water borne preservatives, which contain corrosive salt.

Fixation: The chemical process in which the preservative metals in water-borne solution react with and bond to wood fiber molecules.

Fungi: Organisms (plant-like) that lack chlorophyll and must obtain their food by microscopic, root-like filaments that penetrate wood tissue and absorb its energy rich chemicals.

Hemicellulose: This wood cell material is made from chains of sugar molecules and accounts for about 20% of the dry weight of wood.

Incising: Perforating the wood surface with small slits to improve the penetration and effectiveness of the preservatives. Not necessary with treated Southern Yellow Pine, Ponderosa Pine, and Red Pine.

KDAT: Wood that is Kiln-Dried after Treatment. Pressure-treating with water-borne preservatives adds moisture to the wood, which can be removed by kiln-drying.

Lignin: The stiffening material inside cell walls. Allows trees to grow tall and out-compete other plants for sunlight. Accounts for about 30% of the dry weight of wood.

Moisture Content: The weight of water in wood, expressed as a percent of the oven-dried weight of the wood.

Preservative: Any substance applied to wood that is effective in preventing the development and action of wood destroying fungi and insects.

ACA: Ammoniacal Copper Arsenates
ACC: Ammoniacal Copper Citrates
ACQ: Ammoniacal Copper Quaternary
ACZA: Ammoniacal Copper Zinc Arsenates
CCA: Chromated Copper Arsenates
PCP: Pentachlorophenol (Penta)

Pressure-Treating: The process by which preservatives are applied to wood products. The treatment involves forcing the preservative, and sometimes water sealant, deep into the cellular structure of the wood under pressure in a closed cylinder.

*The world's tallest and fastest roller coaster, the **Rattler** in San Antonio, Texas, uses pressure-treated wood.*

Refractory Species: Wood species that are difficult to treat. These species must be incised prior to treatment to meet AWPA standards.

Sapwood: The younger wood nearer to the surface of the tree, which does not have the natural extractives (chemicals) to prevent decay.

Sealant: A water repellent which may be forced into the wood along with the chemical preservative in a closed cylinder under pressure. However, treated wood should be cleaned and resealed yearly to maintain optimum appearance.

Seasoning: Wood is both air-dried and steam kiln-dried to reduce the water content.

Starch: Sugar is stored in a tree as starch, which is a complex carbohydrate. This is an available energy source.

It is estimated that 6.5 billion board feet (12" x 12" x 1") of wood are conserved each year because of preservative treatment; the equivalent of 435,000 new houses or 226,000,000 trees.

Sources

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American Wood Preservers Institute, (703) 839-4005, www.awpi.com

Chemical Specialties Inc., (704) 522-0825

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Western Wood Preservers Institute, (360) 693-9958, wwpi@teleport.com

The longest distance between two points may be a short cut.
Scott Hamilton



CHAIRMAN, DR. ROBERT G. LEE
PRESIDENT & CEO, ROBERT F. LEGG
VICE PRESIDENT, DR. JOHN H. BALDWIN
TECHNICAL MANAGER, ROBERT S. NORTON
OFFICE MANAGER, RENEE K. KING

14780 SW Osprey Drive, Suite 355
Beaverton, OR 97007
Tel: (503) 579-6762 Fax: (503) 579-0300
e-mail: forestinfo@easystreet.com
<http://www.forestinfo.org>



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