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Treated Wood Pole Management

Foreign Practices

1015562

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PRODUCT DESCRIPTION

This technical update provides information regarding foreign wood pole and wood preservatives management practices. It was developed to provide perspective regarding pole and preservatives management practices in the United States. It also assesses the extent of using non-wood materials for utility structures.

Results and Findings

Many countries outside the United States lack adequate forest resources to support native wood pole industries. These countries either import treated wood poles or produce concrete poles locally. In countries with adequate forest resources, local use of pentachlorophenol (penta) and chromated copper arsenate (CCA) is diminished due to concerns about dioxins and arsenic. Some of these countries are beginning to use concrete poles to reduce the chemical "footprint" of wood preservatives. Utilities in the United States and Canada have the most beneficial combination of forest resources and wood preservatives available.

Challenges and Objectives

Navigating foreign language government and utility websites for relevant management and regulatory information was not productive. Most information is based on interviews and relatively minimal academic sources. Additional research will clarify regulatory positions in other countries and generate improved understanding. This understanding will support strategic planning for U.S. utilities.

Applications, Values, and Use

Utility personnel involved in the purchase, design, use, and disposal of treated wood will find useful information in this report.

EPRI Perspective

This document is the first known attempt to formally characterize similarities and differences in international wood pole and wood pole preservative management. This is useful because, among developed countries, U.S. and Canadian environmental agencies are generally allowing utilities the greatest range of pole preservative choices. Understanding international practices may provide EPRI members with clues to future developments in the United States.

Out-of-service treated wood poles represent a large resource, yet much of the wood goes to landfill. One goal of EPRI's ongoing work is to help the electric utility industry reduce the liabilities and costs of out-of-service pole (OSP) disposal by encouraging alternative disposal options. *Feasibility of Remanufacturing Out-of-Service Western Utility Poles: Phase 2* (EPRI report 1015560) demonstrated that high-quality products can be made from out-of-service wood poles.

Another goal of EPRI's work is to track and assess available and new options for poles. *Assessment of Treated Wood and Alternate Materials for Utility Poles* (1014064) describes characteristics of common and alternative wood pole preservatives and pole materials (for a distribution setting in North America) and describes advantages and disadvantages of each.

Approach

The research team identified practices for selection, regulation, and disposition of utility poles outside the United States. Information was collected through interviews and from websites and published literature.

Keywords

Poles
Treated wood poles
Alternative poles
Creosote
Pentaclorophenol
Chromated copper arsenate

ABSTRACT

This document characterizes similarities and differences in international wood pole and wood pole preservative management. The research team identified practices for selection, regulation, and disposition of utility poles outside the United States. Most information is based on interviews and website and published literature searches. Additional research will clarify regulatory positions in other countries and generate improved understanding, which will support strategic planning for U.S. utilities. Utility personnel involved in purchase, design, use, and disposal of treated wood will find useful information in this report.

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INTRODUCTION

There are approximately 150 million utility structures in service in the United States. The majority are wood poles, owned and maintained by electric utility companies to transmit and distribute electricity. The wood poles are chemically treated with one of three common wood preservatives – creosote, pentachlorophenol (penta), or chromated copper arsenate (CCA) – that extend service life to at least 30 years. The effectiveness of these preservatives is well documented and utilities report that existing materials (mostly wood) and preservative systems are reliable and cost-effective. However, the three preservatives are regulated by the Environmental Protection Agency (EPA).

Utility structures are also manufactured from laminated wood, concrete, fiber-reinforced composites, and steel. The non-wood structures do not require chemical preservation and are expected to meet or exceed the lifespan of a treated wood pole. The manufactured structures are generally more expensive and have separate environmental disadvantages compared to wood poles, such as their energy intensive and carbon releasing manufacturing methods (compared to wood, which is a natural carbon-storage unit).

The electric industry is assessing alternative materials and preservatives, to reduce the carbon and chemical "footprints" of transmission and distribution systems. EPRI and the Utilities Solid Waste Activities Group (USWAG) generated Technical Report #1014065, *Assessment of Treated Wood and Alternative Materials for Utility Poles* (2005, updated in December 2007). The report will be updated again in 2009.

In 2007, the EPRI Poles Working Group requested that EPRI gather information about foreign practices with utility structures and wood preservatives. The information was requested to provide perspective on a global basis and evaluate whether foreign practices might illuminate additional alternatives for reducing the footprint of distribution and transmission systems. This report is a "first look" at the foreign practices.

Information was gathered from a variety of organizations and individuals, as follow:

- Wood Preservation Canada (WPC)
- International Research Group on Wood Preservatives (IRG)
- German Society for Wood Research (GSWR)
- Australian Pesticides and Veterinary Medicines Authority
- Commonwealth Scientific and Industrial Research Organization (Australia)
- National Grid (United Kingdom)
- Osmose (United Kingdom)
- ESKOM (South African utility)
- North Pacific Group (International Pole Vendors)
- Oregon State University, Wood Science and Engineering

Foreign government websites were also visited. The effort provided minimal information because the regulatory systems were difficult to navigate and/or the sites did not provide English pages. Numerous international phone calls were made as well, but direct contact with officials "in the know" was rare. Most information was collected in interviews. Some of the information is inconsistent and requires additional research.

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UNITED STATES

Wood Pole Species

Most distribution wood poles are southern pine – four species consisting of Longleaf pine (*Pinus palustris*), Loblolly pine (*Pinus taeda*), Shortleaf pine (*Pinus echinata*), Slash pine (*Pinus elliotti*), or Douglas-fir (*Pseudotsuga menziesii*). Transmission poles are typically Douglas-fir or Western red cedar (*Thuja plicata*). Most, if not all wood poles, are from well-managed forestland in the US. Wood poles are the most common utility structure in the US.

Alternative Materials

Fiber-reinforced composite (FRC), concrete, steel, and laminated utility structures are also available in the US. In general, these structures are more expensive and require more careful handling than wood poles. As such, they tend to be used where a wood pole is impractical. For example, an FRC pole may be installed in a "backyard" setting where typical truck installation is not possible – because it is so light that a few workmen can install it by hand.

Preservative Treatments

Most wood poles in the US are treated with creosote, penta, or CCA. Copper naphthanate (CuN) is also available and its effectiveness is well documented. The American Wood Protection Association (AWPA) has also approved alkaline copper quat (ACQ) and copper azole (CA-B). ACQ and CA-B do not have a well-established in-service record of effectiveness. These preservatives are also more expensive than creosote, penta, and CCA.

Regulations

CuN, ACQ, and CA-B are non-restricted use pesticides. Creosote, penta, and CCA have been under EPA "review" for pesticide re-registration for almost two decades. Successful re-registration, and continued availability of the three preservatives is generally expected. Assuming the preservatives are re-registered, EPA is required to conduct a new review of each within the next 15 years – if other organizations do not force earlier review via lawsuits or provision of new information that could alter the current risk/benefit analysis.

Practices

Poles treated with creosote and pentachlorophenol are generally regarded as non-hazardous waste, and EPRI (1991) has demonstrated that both types will generally pass the Toxicity Characteristic Leaching Procedure (TCLP). As such, they can be directed toward non-hazardous landfills. Landfill owners, however, may require TCLP testing. CCA-treated wood poles are exempt from hazardous waste rules and can also be directed to non-hazardous waste landfills. Some utilities, however, choose to use hazardous waste facilities to reduce future liabilities.

Some incineration of CCA-treated poles has also been documented. Apparently, combustion facilities still meet permit requirements as long as the rate and volume of CCA treated wood is controlled.

While the public is advised by EPA and manufacturers to avoid burning treated wood poles with the three common preservatives it can be incinerated at facilities with appropriate permits that continue to meet their permit standards. They can also be donated for secondary re-use, such as parking stops. According to anecdotal information, the practice has been reduced of late due to potential liability issues. Sawmilling of retired poles for the economic production of lumber has been attempted, and at least one Texas sawmill has met with success, using creosote-treated poles.

Because the three common preservatives remain available, the demand for poles treated with the alternatives is essentially nil. Each preservative has unique attributes that make them desirable for specific field conditions, but anecdotal evidence suggests that CCA-treated poles are becoming most popular. This is a function of the dry, “clean” surface, the green color, the effectiveness, and the cost.

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CANADA

Wood Pole Species

The main pole species in Canada are red pine, Douglas-fir, and western red cedar, originating from Canadian forestland. However, all three species are native to the border region and some may be imported from the US depending on local availability and cost. Some treated southern pine is also imported from the US.

Alternative Materials

The alternative materials (FRC, concrete, steel, and laminates) are also available in Canada, but are regarded and used as they are in the US.

Preservative Treatments

As in the United States, creosote, penta, and CCA are most commonly used and are restricted to industrial use. Most utilities are shifting toward CCA, based on positive perceptions and perceived advantages. There is no evidence that alternative preservatives (ACQ, copper azole) are in demand.

Regulations

Environment Canada and the EPA coordinate regulatory efforts and continued availability of the three common preservatives in both countries is one result, though there are some differences in management on a Provincial basis. These differences have not been characterized.

Practices

Out-of-service treated wood poles are regarded as hazardous, though there is little "targeting" of them by the government. Since hazardous landfill space is limited and expensive, most retired penta and creosote treated wood is shipped to the US border, where US companies take custody and the hazardous classification is dropped. They are then directed to permitted incinerators. CCA-treated wood poles are not currently a substantial disposal issue because most remain in service.

Retired poles may also be donated for public or private use, but as in the US, the practice has recently been reduced.

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MEXICO, CENTRAL AND SOUTH AMERICA

Wood Pole Species

Mexico, Central, and South America import some CCA-treated southern pine from the US. One local resource is Radiata pine (*Pinus radiata*), but the presence of an associated treatment industry is not apparent. Some tropical countries have native hardwoods that are extremely decay-resistant, but actual use is uncertain.

Alternative Materials

In the cities, concrete poles are frequently used because the concrete industry is better developed than the forest and preservative treatment industries.

Preservative Treatments

Additional information regarding preservatives, regulation, and practices needs to be developed.

Regulations

No information is currently available. Additional research is necessary.

Practices

No information is currently available. Additional research is necessary.

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THE EUROPEAN UNION

The European Union consists of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

CCA-treated wood is not available for residential use and is restricted from many aquatic (piling) and agricultural uses. CCA-treated poles, however, are apparently used in some, but not all of the Union countries, as described below. Creosote is commonly used for wood pole treatment, though the bigger market is "sleepers" (railroad ties).

North Pacific Group reported that penta and creosote treated poles are produced in and exported from Spain, Italy, Greece, Turkey, Norway, Sweden, and Finland.

Environmental regulation has not been standardized throughout the member countries. As such, wood preservatives management is a patchwork consisting of some Union rules and many member states rules. Those that could be defined are discussed below.

The Union is attempting to regulate dioxins. Since some dioxins may be detected at low levels in penta (and generating pure penta is very expensive), one way to control them is to control penta. Based on some interviews, penta has been removed from the market, and therefore from use. However, other interviews indicate that in-service penta-treated poles can remain in use until removal. Other interviews suggest penta is still used in some Union countries to treat poles for export, as described below. Additional research is needed to sort out the specific practices.

Germany

Wood Species

Locally grown Scotch (Scots) pine (*Pinus sylvestris*) is commonly used for distribution poles.

Alternative Materials

No information is currently available. Additional research is necessary.

Preservative Treatments

Penta and creosote poles remain in service, but overall creosote use has declined by half since 1993. No formulations containing arsenic are available for use. As such, CCA is not an option. Other unspecified copper and chrome preservative formulations are available, but there is some concern about these, based on the aquatic toxicity of copper and the potential health effects of chromium.

Regulations

No information is currently available. Additional research is necessary.

Practices

Combustion of penta and creosote-treated wood is allowed at permitted facilities.

Recycling/disposal information was not located.

Sweden

Wood Species

Sweden has one of the most developed and efficient softwood forestry operations in the world. It's currently assumed, but not confirmed, that Sweden grows its own pole stock.

Alternative Materials

No relevant information was located.

Preservative Treatments

IRG archives indicate that CCA was once commonly used for wood preservation, but its use has declined and may not be currently available. ACQ and copper-azole are alternatives. Their use in wood poles could not be confirmed.

Regulations

No information is currently available. Additional research is necessary.

Practices

No information is currently available. Additional research is necessary.

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JAPAN

Detailed information about Japanese materials and practices was not easily available. Additional research is necessary.

Wood Species

Current information suggests there are no native species suitable for wood pole use. This needs independent verification.

Alternative Materials

Most poles are made of concrete.

Preservative Treatments

AAC, ACQ, copper azole became available beginning in 1990. By 2004 the wood preservatives market was composed of 86% “alternatives,” 12% creosote, and 2% CCA (remaining in service).

Regulations

CCA was used in Japan between 1963 and 1995. At that time, the Japanese Water Pollution Prevention Act (1995) set a process water criteria for arsenic at <0.1 milligram per liter. It essentially resulted in a removal of arsenic from the market.

Practices

Specific details about wood pole management and use in Japan were not found. Only general information on wood preservatives was located.

Incineration or donation of retired poles is not allowed. The only disposal option is landfilling.

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CHINA AND RUSSIA

Detailed information about Chinese and Russian materials and practices was not easily available. Additional research is necessary.

Wood Species

Both countries have substantial forest resources, but lack species that are well suited for pole use (or have higher value for other products). China imports some CCA treated poles from the US. Douglas-fir is grown on plantations in Russia, but the practice is not well developed and the wood quality is said to be poor.

Alternative Materials

Like Mexico, both China and Russia have well developed cement production infrastructure, so concrete poles are common.

Preservative Treatments

China and Russia continue to use substantial amounts of coal for energy production and coke operations. As such, both countries are major producers of creosote (a derivative of coal tar). China is also a leading producer of arsenic.

Regulations

No information is currently available. Additional research is necessary.

Practices

No documentation regarding management or disposal of preservative treated wood was located. Anecdotal information suggests there is little or no regulation of preservatives or disposal practices.

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INDIA

Detailed information about Indian materials and practices was not easily available. Additional research is necessary.

Wood Species

Wood poles are uncommon in India because appropriate native species are not available.

Alternative Materials

Concrete is the most common material.

Preservative Treatments

CCA was developed in India in 1933. CCA and acid-copper-chrome (ACC) are widely used for timbers. Creosote is mainly used for transmission poles and marine structures.

There are several “alternative” preservatives in India, but there is no information on the effectiveness or behavior of these preservatives that include copper zinc borate and ammoniacal copper borate.

Regulations

No information is currently available. Additional research is necessary.

Practices

No information is currently available. Additional research is necessary.

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AUSTRALIA AND NEW ZEALAND

Wood Species

Most wood poles in Australia are native grown eucalyptus. However, this resource is dwindling.

Alternative Materials

Since the native wood pole resource is shrinking there is a materials shift toward concrete.

Preservative Treatments

CCA and creosote are commonly used to preserve wood poles. Of late, a shift toward CCA has occurred. The apparent driver is linemen, who have complained of creosote-related "sunburn". Penta is not available for use in Australia. CCA, ACQ, copper azole, creosote, and pyrethroid/metal-based light organic preservatives are available.

Regulations

Wood preservatives in Australia are regulated by the Australian Pesticides and Veterinary Medicines Authority (APVMA) and the Department of Environment and Climate Change. The New Zealand Environmental Risk Management Authority has re-registered CCA following a 2003 review. Residential use is not restricted, but it is not recommended either.

Practices

CCA-treated wood waste must be disposed of in "certain" landfills (no defining information) – TCLP testing may apply. Recycling of poles for landscaping is common.

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MALAYSIA AND THE PHILIPPINES

Detailed information about Malaysian and Philippines materials and practices was not easily available. Additional research is necessary.

Wood Species

Malaysia is known to have significant tropical forest resources, and certain tree species are reported to be naturally decay resistant. However, research sponsored by EPRI suggests that political instability prevents appropriate control of forest management practices. Other anecdotal information indicates that decay-resistant trees are more valuable for products other than poles. Little is known about forest resources in the Philippines.

Alternative Materials

As with Mexico and India, the cement industry is well established and these tropical countries produce and use concrete poles.

Preservative Treatments

In general, CCA and creosote treated poles have been used in Southeast Asia, though the preservative sources and wood species are unknown.

Regulations

No information is currently available. Additional research is necessary.

Practices

No information is currently available. Additional research is necessary.

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MEXICO, CENTRAL AND SOUTH AMERICA

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Alternative Materials

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Preservative Treatments

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Regulations

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Practices

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