PLASTICS WOOD -- CAN IT COMPETE WITH THE REAL STUFF?

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Summary

The terms "plastic wood" and "plastic lumber" refer to lumber-like profiles consisting of low-melt (below 200oC) thermoplastic polymers (e.g., polyethylene, PE; polypropylene, PP; polystyrene, PS; and polyvinyl chloride, PVC), after reinforced and/or filled with wood flour and/or inorganic fillers. The most common methods of processing plastic lumber are "flow moulding" (e.g., extrusion into moulds) and continuous extrusion with a twin-screw compounding extruder. The most frequently used plastic is polyethylene (both high density and low density, or HDPE and LDPE, respectively), recovered from industrial, commercial and consumer waste streams. The bending properties of plastic lumber are lower than those of treated wood (e.g., MOR in the range 1,500- 3,000 psi, and MOE of 150,000 - 250,000 psi), and its density is considerably higher (e.g., 0.80 - 0.95 g/cm3) than that of wood. Also, on the negative side, plastic lumber creeps considerably more than wood, and it is 50% to 100% more expensive. Thus, with so many handicaps, can plastic lumber compete with the "real stuff"? Its manufacturers and proponents think so. They list the positive attributes of plastic lumber which include, low maintenance, high durability, good fastener holding ability, dimensional stability, works with standard woodworking tools, uses reclaimed materials and ease of recyclability. Target market for plastic lumber include marine structures (e.g., floating docks), landscaping, playground structures, board walks, residential decks, highway offset blocks, parking stops and industrial flooring. Clearly the market place, based on price, properties and performance, will be the final arbitrator for the success (or failure) of plastic lumber as well as for the real stuff".

GENERAL PHYSICAL PROPERTIES OF PLASTIC LUMBER*

Company	American EcoBoard Inc.	Custom-Pac Extrusions Inc.	Rumber Materials Inc	Trimax Inc
Product Name	"EcoBoard"	"Polytimbre"	"Rumber"	"Trimax Board"
Composition	70% HDPE 30% LDPE	100% HDPE	50% HDPE 50% Rubber Tires	75% HDPE 20% Fiberglass 5% other
Specific Gravity (g/cc)	0.75	0.930-0.980	0.902	0.75
Modulus of Elasticity (psi)	200,000-238,000	160,000	na	450,000 (ASTM D198)
Modulus of Rupture (psi)	3000 (ASTM 638)	2650	na	2960 (ASTM D198)
Tensile Strength (psi)	3055	1500	3181 (ASTM D413)	1250 (ASTM D198)

*Data supplied by plastic lumber manufactures.
All plastics are reclaimed materials.

SOIL CONTAMINATION FROM POLES - USA

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Summary

The Electric Power Research Institute (EPRI) has conducted a nationwide field measurements effort involving 190 in-service wood poles used in the transmission and distribution of electricity in the United States. The field work consisted of collecting soil samples as a function of distance and depth at these pole sites. The soil samples from 168 pole sites were analyzed for pentachlorophenol (PCP), other chlorophenols, and total petroleum hydrocarbons (TPH), and 22 pole sites were analyzed for polycyclic aromatic hydrocarbons (PAHs), which are indicative of creosote preservation. Soil samples from each site were also analyzed for selected physical and chemical properties. Subsamples were used to conduct laboratory studies for determining distribution coefficients (K_d) and biodegradation coefficients (K). Examination of different subsets of the data revealed that the general trends in attenuation and migration potential were very similar from pole site to pole site. The chemical data revealed rapid attenuation of PCP, TPH, and PAH soil concentrations with increasing distance from the pole. Transport/fate modeling using EPRI's ROAM™ was performed using the data, and preliminary results showed that the attenuation factors (AFs) for PCP from in-service poles generally exceeded the value of 10,000.

1. Introduction

Electric utilities often use wood poles treated with pentachlorophenol (PCP) or creosote in their transmission and distribution systems. Currently, there are approximately 60 million utility-owned wood poles in service across the United States, of which about 36 million are PCP-treated and 18 million are creosote-treated (Malecki, 1992). About 3 percent of these poles are replaced annually, necessitating the disposal or reuse of used poles in accordance with U.S. Resource Conservation and Recovery Act (RCRA) regulations (EPRI, 1990).

The U.S. RCRA Toxicity Characteristic (TC) rule used the chemical-specific Maximum Contaminant Levels (MCLs) promulgated under the U.S. Safe Drinking Water Act as the basis