

HOMEOWNER ATTITUDES AND PREFERENCES FOR BUILDING MATERIALS WITH AN EMPHASIS ON TREATED WOOD PRODUCTS

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ABSTRACT

Public concerns regarding the safety of treated wood are increasing as a result of increasing negative publicity in the media. Public concern can also be attributed to livability issues with respect to two stages of the treated wood life cycle: installation and disposal. This research was conducted to ascertain homeowner attitudes and preferences for building materials with particular emphasis on treated wood products. The results largely indicate that homeowners have a generally positive opinion of the safety and performance of treated wood. A large majority of respondents indicated a positive overall perception of treated wood in that they are willing to use the product inside or near their home. The major reasons of those unwilling to use treated wood are due to livability and health concerns. Respondents indicated that individual wood products companies are the least trusted to provide consumers with treated wood safety and handling information and environmental organizations are the most trusted.

Society depends on wood for a variety of uses. As population increases, so does our need for wood. In areas subject to a high risk of decay, wood that is treated with preservatives is often recommended to prevent decay and insure structural integrity. Steel, concrete, plastic, and aluminum are alternatives to treated wood in certain applications, but this may result in higher costs, higher energy requirements in the extraction and fabrication processes, greater environmental degradation, or higher dependency on foreign sources for imported materials. Public concerns regarding the safety of treated wood are heightened as a result of increasing amounts of treated wood going into service as well as increasing amounts of treated wood coming out of service. The traditional dis-

posal method of landfilling is becoming more expensive and more environmentally unacceptable to the public.

Substitute materials to treated wood have gained substantial momentum as a result of allegations regarding leaching of arsenic from wood treated with chromated copper arsenate (CCA) and possible negative effects on human health. The *St. Petersburg Times* conducted an investigation and reported that

CCA-treated wood leakage resulted in arsenic levels higher than state environmental officials consider to be safe (Anonymous 2001).

On February 12, 2002, the Environmental Protection Agency (EPA) announced a voluntary decision by industry to move consumer use of treated lumber products away from a variety of pressure-treated wood that contains arsenic by December 31, 2003, in favor of new alternative wood preservatives. This transition affects virtually all residential uses of wood treated with chromated copper arsenate, also known as CCA, including wood used in play-structures, decks, picnic tables, landscaping timbers, residential fencing, patios and walkways/boardwalks. By January 2004, EPA will not allow CCA products for any of these residential uses. This decision will facilitate the voluntary transition to new alternative wood preservatives that do not contain arsenic in both the manufacturing and retail sectors. Although the Agency has not concluded that there is unreasonable risk to the public from these products,

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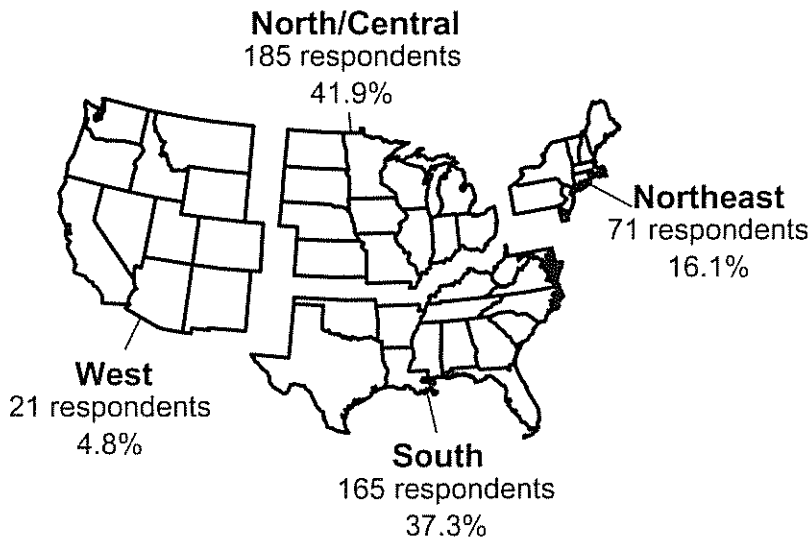


Figure 1. — Respondent geographic regions ($n = 451$).

we (the EPA) do believe that any reduction in exposure to arsenic is desirable (EPA 2002)

A current third-party study by Scientific Certification Systems (SCS) is determining the effects of direct skin contact with CCA-treated lumber as well as any potential leaching of arsenic under CCA-treated playground equipment. The study has found that even in worst-case scenarios, the potential of risk from either case is well below the U.S. EPA standard. Sinclair and Smith (1990) stated that perhaps the greatest threats to the competitiveness of treated wood in the market come from misinformation from mass media, and substantial market penetration and marketing programs by treated wood alternatives.

The issue of building material durability has become increasingly important in recent years as a result of the Formosan subterranean termite situation in the southern United States, particularly Louisiana (Shupe and Dunn 2000). Treated-wood producers as well as treated-wood substitutes manufacturers have used this opportunity to market the advantages of their respective products.

A study by Sinclair and Smith (1990) found that retail customers were not fully informed about the proper use, handling, and disposal of treated lumber products at that time. A more recent study by L.C. Williams and Associates (1999) for the American Wood Preservers Institute found that there is an increase in people's concerns over the

public and private use of pressure-treated wood and people's awareness of substitutes to pressure-treated wood (1999 compared to 1996 and 1993). There was less agreement that the use of pressure-treated wood, as opposed to substitutes, is good for the environment.

Perceptions about treated wood can be couched in terms of risk. According to one theory, the magnitude of perceived risk is determined by uncertainty and consequences (Cox 1967). Uncertainty about outcomes of actions and behaviors may be reduced through information acquisition and an understanding of how consequences of actions can be minimized (Taylor 1974). Schiffman and Kanuk (1983) identified the five major types of risk perceived by consumers as functional, physical, financial, psychological, and social risk. Products, therefore, can be categorized in terms of the type and intensity of risk perceptions they evoke from consumers (Zikmund and Scott 1973). Physical risk may be examined in a framework that includes both technical and social issues (Slovic et al. 1981). Any system developed to protect consumers from risk associated with products must take into consideration technical factors as well as consumers' psychological or internal subjective factors (Jacoby 1981). Whereas subjective, or perceived, risk is the key influence on consumer behavior, the technical or objective aspects of risk must not be overlooked. However, consumers respond only to hazards or risks they perceive (Slovic et al. 1981). Should

the consumer fail to recognize that a risk exists, then behavior cannot be modified to reduce the risk (Jacoby 1981).

The objectives of this study were to understand homeowner attitudes and preferences for various home building construction materials and to discern how treated wood construction is perceived to be correlated to livability.

SURVEY METHODS

In general, sampling, survey procedures, follow-up efforts, and data analysis were conducted in accordance with well-documented and verified techniques (Fowler 1996, Malhotra, Hair et al. 1992, Dillman 1978).

The sample frame for the study consisted of a random sample of homeowners in the United States. The source of sample frame information is U.S. census data. The sample set was purchased from Best Lists, a national survey list company. A total of 1,500 homeowners were surveyed.

The method of data collection was a mail survey questionnaire. Mail questionnaires were chosen as the most cost-effective method of data collection. The method affords a high degree of anonymity and is less limited by rigid time constraints that can impede the effectiveness of other survey methods. The Total Design Method for mail surveys recommended by Dillman (1978) was followed in this study. Accordingly, survey procedures included a pre-notification postcard, a cover letter accompanying the initial questionnaire, a follow-up postcard, a second follow-up letter, and a second copy of the questionnaire.

RESULTS

DEMOGRAPHICS

Of the 1,500 surveys mailed, 98 were either undeliverable or unusable. Of the adjusted sample size (1,402), 451 usable surveys were returned for an adjusted response rate of 32 percent.

Figure 1 shows the geographic distribution of respondents. Although all regions of the country were represented, there was a lower percentage of respondents from the West, a reflection of U.S. population density patterns.

Nearly two-thirds of respondents were male, 49 percent of respondents were in the 41- to 60-year-old age class. An additional 35 percent were 61 to 80 years old. The minimum and maximum respondent ages were 26 and 97, respec-

TABLE 1. — *New house purchase criteria.*^a

	Total (n = 451)	West (n = 21)	North Central (n = 185)	Northeast (n = 71)	South (n = 165)
Energy efficient	4.7	4.9	4.7	4.8	4.6
Cost of the house	4.6	4.7	4.6	4.5	4.5
Resale value	4.6	4.7	4.6	4.6	4.5
Resistance to wood-destroying insects	4.4	4.5	4.2	4.4	4.6
Resistance to wind damage	4.2	3.9	4.2	4.3	4.3
Resistance to flooding	4.2	3.8	4.0	4.3	4.3
Free from as many chemicals as possible	4.0	4.3	4.0	4.2	4.0

^a Mean scores; scale: 1 = least important to 5 = most important.

TABLE 2. — *Perception of the number of years materials last aboveground exposure.*

	0 to 10 yr.	1 to 25 yr.	More than 25 yr.
	(% of respondents)		
Concrete	2	24	73
Steel	6	22	72
Naturally durable species (cedar, redwood)	19	56	25
Treated lumber products	18	67	15
Untreated lumber products (pine, spruce, fir)	84	14	1

TABLE 3. — *Level of harm to the environment caused by building material manufacturing processes.*^a

	Mean (agreement) "Can do harm to the environment"	Percent stating agree or strongly agree (%)
Plastic	3.6	55
Steel	3.4	48
Treated lumber	3.3	38
Concrete	2.8	24
Untreated lumber	2.6	18

^a Scale: 1 = strongly disagree to 5 = strongly agree.

tively. The mean was 59 years old. Following typical U.S. demographics, 71 percent of respondents were married or living with a partner, 11 percent were divorced, 11 percent were widowed, and 7 percent were never married. Over 50 percent of respondents had a college degree, either a B.S. or an advanced degree. An additional 30 percent had some college and 17 percent were high school graduates. With regard to household income, 28 percent of respondents earned \$40,000 to \$60,000 annually in 2000. An additional 20 percent earned less than \$40,000 and 20 percent earned \$100,000 or more in 2000. Respondents were heavily skewed ethnically/racially with 91 percent represented by Caucasians. The only other group represented to any degree was African-Americans at 4 percent of respondents. Fifty-seven percent of respondents lived in urban ar-

reas of 50,000 or more residents. Just over a third lived in small cities and 6 percent lived in rural areas with populations of less than 2,500 residents.

PERCEPTIONS ABOUT BUILDING MATERIALS

Before discussing treated wood products specifically, respondents were asked a number of questions regarding building materials in general. This helps to understand where treated wood is positioned in the minds of respondents.

NEW HOUSE PURCHASE CRITERIA

Energy efficiency was the most important criteria to respondents when considering the purchase of a new home (Table 1). Respondents in the West ranked this criteria higher than other regions did. Initial cost of the house and resale value were ranked next. Once again, they were ranked higher in the West. Resistance to wood-destroying in-

sects also ranked high in the South, and ranked fourth overall. On average, all factors were ranked 4.0 or higher on a 5-point scale, indicating that these factors are all important to respondents in all regions.

Respondents were asked to rate resistance to weather exposure for a number of building materials (Table 2). In the category of "more than 25 years," concrete and steel were highest rated followed by naturally durable wood species such as cedar and redwood. Treated wood was next and only 1 percent of respondents felt that untreated wood would last more than 25 years in exposed weather conditions. Of interest to treated wood manufacturers is the fact that over two-thirds of the respondents believed that treated wood will last 11 to 25 years in exposed conditions.

Respondents were asked to assess the relative damage to the environment caused by the manufacturing process for a number of building materials (Table 3). Over 50 percent felt that plastic causes most damage in this respect. Almost 50 percent felt this is the case for steel. Treated lumber followed with 38 percent of respondents, followed by concrete (24% of respondents). Only 18 percent felt that the manufacturing of untreated wood products causes harm to the environment.

PERCEPTIONS ABOUT TREATED WOOD

The first fundamental treated wood question posed to respondents was with regard to their overall perception of this product. Figure 2 indicates that only 5 percent of respondents had a negative perception of treated wood; 40 percent had a somewhat positive perception and nearly a quarter had a very positive perception.

This positive perception of treated wood is supported by the fact that 75 percent of respondents said that they are willing to use this product in/at their home. Of the 327 respondents that said they would use treated wood, 42 percent lived in the South, 67 percent were male, and 51 percent had a college degree. For the 25 percent of respondents that said they would not use treated wood in their homes, **Figure 3** indicates the major reasons for this. The greatest concern was the perceived health risk followed by a closely related concern, long-term exposure to treated wood. Forty-one percent of respondents indicated they did not know enough about treated wood, while 36 percent were concerned about product performance.

GENERAL TREATED WOOD ISSUES

Respondents developed their opinions on treated wood in a variety of ways. The top-ranked methods, in order, were friends, magazines, newspapers, and television. Fifty-four percent of respondents said they would pay a premium for treated wood over the non-treated alternative; 49 percent of respondents said they understood the concept of wood treating; 45 percent believed that using treated wood can reduce deforestation; and only 27 percent of respondents trusted claims made by treated wood manufacturers.

TREATED WOOD APPLICATIONS AND PURCHASES

Respondents used treated wood at their residence in a variety of ways (**Table 4**). At the top of the list, 52 percent had decks made of treated wood at their homes. Landscape timbers followed closely at 50 percent of respondents, while 37 percent had outdoor structures constructed from treated wood.

Respondents were asked if they had plans to purchase treated wood products in the next year. A quarter of respondents planned to purchase landscape timbers, 19 percent planned to purchase decking, 17 percent planned to purchase treated fence posts or rails, and 16 percent of respondents planned to purchase "Other" treated products.

SAFETY ISSUES

Twenty one percent of respondents are aware of treated wood consumer information sheets. These are often available at point-of-purchase in consumer retail locations. Respondents were asked to evaluate the level of health risk for a

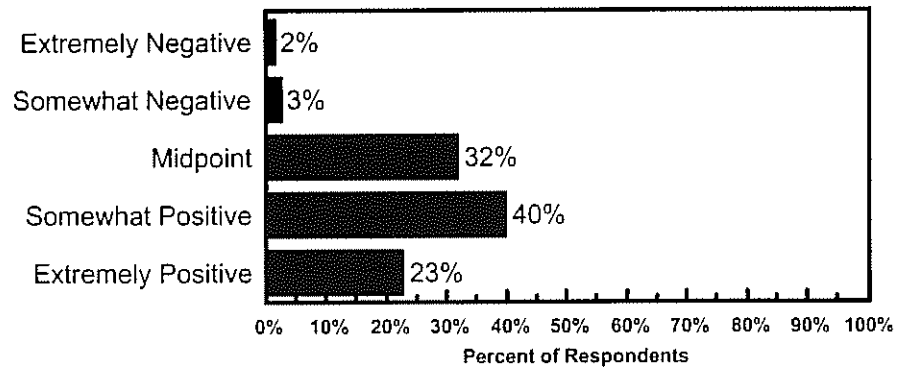


Figure 2. — Overall perception about treated wood ($n = 433$).

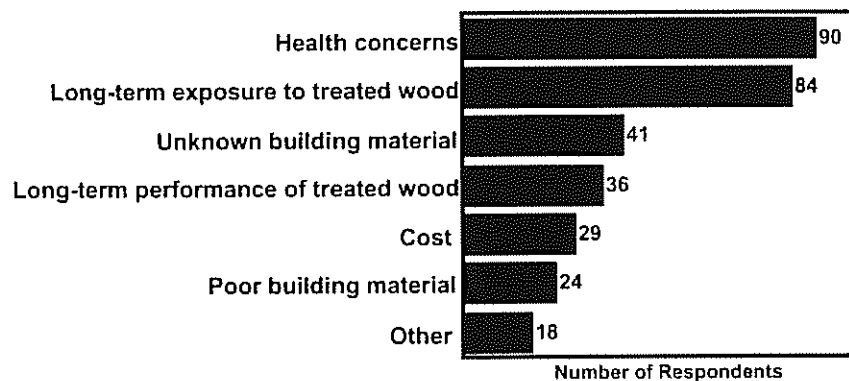


Figure 3. — Reasons why respondents will not use treated wood in their homes (multiple responses possible).

TABLE 4. — Treated wood applications used in current residence.

Application	No. of respondents	Percent of respondents (%)
Decks	235	52
Landscape timbers	227	50
Outdoor structures	165	37
Outdoor furniture	77	17
Wall/roof/floor framing in your home	68	15
Other	66	15
Home exteriors	65	14
Permanent wood foundations	38	8

number of treated wood applications (**Table 5**). Using a statistical technique called maximum likelihood factor analysis, these applications were segmented into two "factors" (Hair et al. 1992). A factor loading greater than 0.50 was used as separation criteria to reduce the data. These factors can also be construed as being surrogate variables having analytical and managerial implications.

Surrogate variables are particularly useful in exploratory research. These two factors represent 54 percent of the variance in the seven items.

The "Safe Applications" factor contains five items. Over two-thirds of respondents felt that treated wood is safe for humans in outdoor applications. 56 percent felt that it is safe if handled and disposed of properly, and 47 percent felt

TABLE 5. — Treated wood safety issues.^a

	Mean score	Percent stating agree or strongly agree (%)
<u>Safe</u>		
Treated lumber is safe for outdoor human contact applications	4.0	69
With proper use, handling, and disposal, treated lumber is entirely safe	3.7	56
Treated lumber is safe to builders	3.5	47
Treated lumber is safe to children for outdoor play equipment	3.3	41
Treated lumber is safe to be near pets or farm animals	3.3	38
<u>Unsafe</u>		
Treated lumber is safe to residents for indoor applications	2.8	17
Treated lumber is safe for food handling	1.8	9

^a Scale: 1 = strongly disagree to 5 = strongly agree.

it is safe for builders to use. Forty-one percent felt it is safe for outdoor children's play equipment and 38 percent believed treated wood is safe for pets or farm animal exposure. The "Unsafe Applications" factor contains the remaining two items. Seventeen percent of respondents believed that treated wood is safe for indoor applications and 9 percent thought it is safe in food handling applications (chopping boards).

In addition to the factor analysis, 31 percent of respondents agreed or strongly agreed that treated wood emits odors and just over 60 percent desired additional information on treated wood handling, proper use, and disposal. Nearly a third of respondents believed that some types of treated wood are safer than others while nearly two-thirds were unsure. This has important implications for product differentiation by manufacturers.

Associated with product safety is the issue of trust to provide accurate safety information to consumers. Respondents indicated that the least trusted entities to provide this information are wood products manufacturers (Fig. 4). The most trusted entities are environmental organizations.

CHEMICALS/COMPOUNDS USED IN TREATING WOOD

Respondents were asked to evaluate their familiarity with a number of chemicals or compounds used in the treating of wood. As seen in Table 6, 70 percent of respondents were familiar with creosote. Familiarity drops dramatically for all other chemicals listed.

In addition to perceptions of chemicals/compounds that are contained in treated wood products, respondents were asked to evaluate the health risk to humans for a number of chemicals/com-

TABLE 6. — Familiarity with treated wood chemicals.

Chemical	No. of respondents	Percent of respondents ^a (%)
Creosote	316	70
Zinc oxide	92	20
Borax	86	19
Penta	62	14
CCA	42	9
Magnesium dioxide	32	7

^a Percent of respondents that are familiar.

pounds in general (Table 7). Arsenic heads the list with 71 percent of respondents stating that it poses a significant risk to human health. The perception of health risk drops sharply for the remaining chemicals. Interestingly, 5 percent felt that water and 2 percent felt that oxygen pose significant health risks, respectively.

Many respondents had no opinion, indicating a lack of knowledge about many of the chemicals listed.

CONCLUSIONS

This research was initiated to ascertain consumer attitudes and preferences for building materials with particular emphasis on treated wood products. In general, respondents reported that treated wood is a good building material from both a structural and a health perspective. It is anticipated that treated wood can play a major role in new home construction as well as existing home repair and remodeling projects as evident by the favorable opinion of treated wood durability and livability. The major reasons of those unwilling to use treated wood are due to livability and health concerns. Respondents indicated that individual wood products companies are the least trusted to provide consumers

with treated wood safety and handling information and environmental organizations are the most trusted. Therefore, the opportunity exists for the treated wood industry to improve its credibility in the eyes of the general public.

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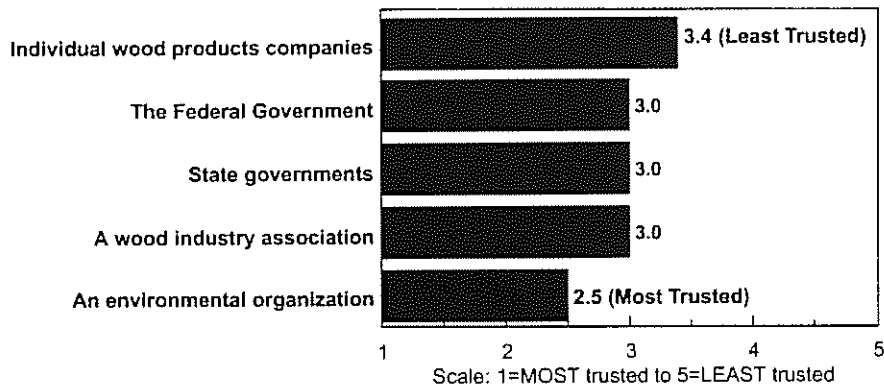


Figure 4. — Entity trusted to provide consumers with treated wood safety and handling information (n = 451).

TABLE 7. — Perceptions of health risk to humans from exposure to selected chemicals.

Chemical	1	2	3	4	5	No opinion
	Poses no health risk		Poses somewhat of a health risk		Poses a significant health risk	
	----- (%) -----					
Arsenic	0	0	6	10	71	9
Chromium	10	7	18	14	15	32
Boron	4	8	17	11	8	45
Hydrogen	28	13	13	4	6	31
Zinc	12	14	18	14	6	32
Water	38	20	17	4	5	12
Borax	10	16	16	10	5	38
Copper	21	19	20	7	2	26
Oxygen	55	12	8	2	2	16

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