Evaluating Spent CCA Residential Decks for Second-life Products

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Abstract: The amount of CCA treated wood being removed from spent residential decks is increasing at a tremendous rate. While most spent CCA treated wood is being disposed in landfills, further useful and environmentally beneficial alternatives have to be met. This research estimated the percentage of recoverable lumber from spent CCA decks that can be recycled into other usable products. Six residential decks were removed from service, by either demolition or deconstruction procedures. It was found that 86% of the CCA treated wood from the residential decks could be recovered as reusable CCA treated lumber. It was also found that deconstruction of a residential deck, rather than demolition, was not a factor in the volume of CCA treated wood recovered. Chemical and mechanical properties of the removed CCA treated wood were also analyzed. The chemical retention of the deck material proved that most of the spent CCA treated wood could be used in above ground applications. The stiffness of spent CCA treated wood from residential decks was approximately equal to that of recently treated CCA wood. The strength properties were slightly lower than recently treated CCA wood probably due mainly to physical and climatic degradation. Products were then produced that could be successfully utilized by recycling centers or community and government organizations. Products manufactured included, pallets, picnic tables, outdoor furniture, residential decks, and landscaping components. Waste management, recycling, and government organizations were interviewed to determine what markets and barriers exist for recycled CCA treated products. Most landfill and recycling facilities do not currently sort or recycle CCA treated wood, citing the main reason as a lack of a viable market. Potential users were interested in the material but citied they did not know where to locate the material. A communication barrier exists between the waste management industry, recyclers, and users; which is preventing the successful recycling of CCA treated wood from spent residential decks.

Introduction

The production of CCA treated wood in the United States has grown significantly since it's inception in the 1960's, and from 1984 to 1998 the production of CCA treated wood rose fifty percent (Micklewright, 1998). The Southern Forest Products Association (SFPA) (2002) reports that 6.8 billion board feet of Southern Yellow Pine (SYP) was treated with CCA in 2001, representing over 40% of the total production of SYP. In comparison, only 2 billion board feet were produced that represented only 23% of the total production of SYP, in 1980. The construction and remodeling of residential decks is the largest market for CCA treated wood in the United States. The SFPA estimated that in 2001 the construction, repair and remodeling of residential decks comprised 40%, or used 2.1 billion board feet in 2001 of the total CCA treating market in the United States (1999). The SFPA also estimates that from 2001 to 2004 the residential deck market will use over 8 billion board feet of CCA treated wood (1999). In addition, several investigators have indicated that approximately 80% of decks constructed in the United States used CCA treated wood (Shook and Eastin, 2001). Several environmental organizations have recently waged a campaign against the use of CCA chemicals, because of its potential, but controversially, safety and environmental side affects. With this negative publicity the Environmental Protection Agency (EPA) along with wood preservative industry have voluntary discontinued the use of CCA treated wood in residential construction (EPA, 2002). The production of CCA treated wood products for residential use will cease at the end of 2003, but the disposal of the material will continue for decades.

The increase in production and use of CCA treated wood over the past several decades is mirrored by the predictions of large volumes of CCA treated wood reaching the end of its useful life. Cooper estimated that from the year 2000 to the year 2020 the disposal of CCA treated wood will increase 9 fold (Cooper, 1993), and several from service each year. Alderman (2001) estimated that approximately 1 billion board feet a year of CCA treated wood is being removed from the dismantling of residential decks. McQueen and Stevens (1998) estimated that in 1999, 935 million board feet was removed from spent residential decks, The majority of the spent CCA treated wood removed from decks, by either demolition or remodeling, is disposed of in landfills. Alderman's research in 2001 indicated that over 50% of building contractors disposed of the spent CCA treated wood in landfills exclusively. Research performed by McQueen and Stevens (1998) stated that 66% of CCA treated wood decks are being disposed of in landfills.

As a result, the environmental impact of disposed CCA treated wood is also becoming a growing concern. Many governments and researchers are investigating the potential hazards of spent CCA treated wood in landfills (Tom, 2001a, Tom, 2001b, Matus, 2002, and The Alachua County CCA Team, 2001, Solo-Gabriele and Townsend, 2002). If stricter regulations on the disposal of CCA treated wood are enacted, tipping fees will mostly likely increase, the availability of adequate disposal sites will decrease, and the demand for non-wood alternative products will rise.

The average age of a deck at removal from studies by McQueen and Stevens (1998) and Alderman (2001) was 9 and 12.8 years respectfully. There were many reasons for removal of the deck by the homeowner, but the research by Alderman (2001) and McQueen and Stevens (1998) both found aesthetics to be one of the most important factors. Other factors that lead to the replacement of a deck were the amount of decayed wood, physical degradation of the wood, and structural integrity of the deck (Alderman, 2001). If aesthetics was the most important factor for the removal of a deck, the results raise questions as to the amount of usable lumber being discarded. Furthermore, research by McQueen and Stevens (1998) in 1995 stated that 17% of removed decks were reused, and Alderman's research indicated that only 4% of a spent CCA treated deck is being reused.

In order for the recovery and reuse of spent CCA treated wood from residential decks to be successful a great deal information needs to be gathered. First, the volume of CCA treated wood that can be recycled from residential decks needs to be determined, and if removal practices dictate the percent recoverable. Second, chemical and mechanical properties need to be analyzed to determine where and in what applications the recovered wood can be used. Finally, practical products for recyclers and markets must be found to make recycling CCA treated residential decks a viable alternative to disposal. These factors in the recovery of CCA treated residential decks will be addressed in the following sections.

Residential Deck Recovery

Building contractors were contacted in the area surrounding Blacksburg, VA to obtain spent CCA treated residential decks. Once a CCA treated deck was located, prior to removal an accurate area and volumetric measurement and piece count of the deck was obtained. A questionnaire was given to the homeowner to gain and understanding of their satisfaction of the old deck, factors of the deck they found desirable, and what they plan to build after the spent deck is removed. A total of six decks were obtained, four that were demolished, following the typical building contractors techniques, and two decks were deconstructed. The discarded material was delivered to the Brooks Forest Products Laboratory's log yard, where the hardware (nails, screws, joist hangers, etc.) was removed from each deck and then similar wood products stacked together. Unusable areas of the lumber, which consisted of damaged sections due to removal practices, excessive nail holes, physical and environmental degradation, and decay, were removed in order to achieve at least No. 2 grade, according to the Southern Pine Inspection Bureau's *Grader Manual for Boards and 2" Dimension* (1991), for the recovered lumber. The time, labor, and material costs were all calculated to recover the CCA treated wood from each residential deck.

Table 1 displays the time of service and square feet of each deck prior to removal, the average time in-service was almost 18 years, and the average deck size was 220 square feet. All decks were composed of Southern Yellow Pine (SYP), with the exception of Deck No. 5, which was stamped "mixed pine" and might have contained some Virginia pine *(Pinus virginiana)* or pond pine *(Pinus serotina).* As would be expected the decking and joists

Table 1. Service time and size of decks in study.

Deck No.	Time In-Service (years)	Deck Size (square feet)
1	13	239
2	27	150
3	18	200
4	17	210
5	17	160
6	14	360
Average	17.7	220

components of the decks comprised the largest volume, 38% and 29% respectively, as shown on Table 2. Therefore, as shown on Table 3, the largest volume of CCA wood was 2x6s, mainly used for decking, and 2x8s, mainly used for joists.

Several questions were asked of the deck owner regarding the reason for removal and attributes of the deck prior to removal. Not surprisingly, aesthetics, poor safety features, and physical degradation of the wood were listed as the top reasons for deck removal. The overall satisfaction level of the deck from the owners was low. Of the six decks obtained four owners claimed to be unsatisfied with the deck while the other two were satisfied. Another question asked the deck owner was who made the decision on the building material used to construct the new deck. Two-thirds of the owners indicated that the building contractor made the decision and the other third stated that they made the decision. The results of the questions were interesting because with all the negative press about the safety and environmental concerns with CCA treated wood most owners and building contractors still chose this material. Therefore, the research suggests that the cost of material, and possibly the ease of fabrication, is still a bigger factor than the possible negative side affects that environmental groups and the media have portrayed CCA treated wood to be associated with. The final question asked the deck owners to rate several attributes of the spent residential deck from a range of 1 (very satisfied) to 5 (very unsatisfied). The results of the question are displayed in Figure 1. The amount of insect damage, or lack there-of, was the highest rated attribute in terms of satisfaction. The deck owners rated overall deck construction and the lack of decay in the deck to be above average. Deck owners rated the aesthetics, amount of degradation, safety, and style of the deck as low in terms of their satisfaction. This indicated that the performance of the CCA chemical met the standards desired by the homeowners, but the quality of construction and the physical degradation of wood (i.e., warp, twist, bow, etc.) did not meet the homeowners desired level of expectation.

The average percent of material recovered from all the spent residential decks received in this study was 85.8%, as shown on Table 4. The percent recovered ranged from a high of 94% (Deck No. 2) to a low of 76% (Deck No. 3). Deck No.2 had the highest amount of CCA treated wood recovered, but was also the oldest deck in-service (27 years). Deck No. 1 was the youngest deck in the study (13 years) and the amount of CCA treated wood recovered was average compared to the percent of recovered CCA treated wood from the other decks. Therefore, the age of the deck while in-service does not appear to have an affect on the amount of CCA treated wood that can be recovered after removal. Other factors such as the severity of the physical and climatic environments might be a larger factor in the success of recovery CCA treated wood from residential decks.

Table 2/Table 3. Volume of components and dimensional lumber in decks prior to removal.

Volume of Components in Decks		
Component	Volume (Bd.Ft.)	% of Total
Decking	1789	38.4
Railing	810	17.4
Stairs	387	8.3
Joists	1359	29.2
Posts	261	5.6
Lattice	32	0.7
Misc.	15	0.3
Total	4654	100.0

Volume of Dimension Lumber in Decks		
Dimension	Volume (Bd. Ft.)	% of Total
5/4x6	281	6.0
2x2	147	3.2
2x4	321	6.9
2x5	17	0.4
2x6	1777	38.2
2x8	862	18.5
2x10	463	9.9
2x12	154	3.3
1x6	243	5.2
4x4	336	7.2
lattice	53	1.1
Total	4654	100.0

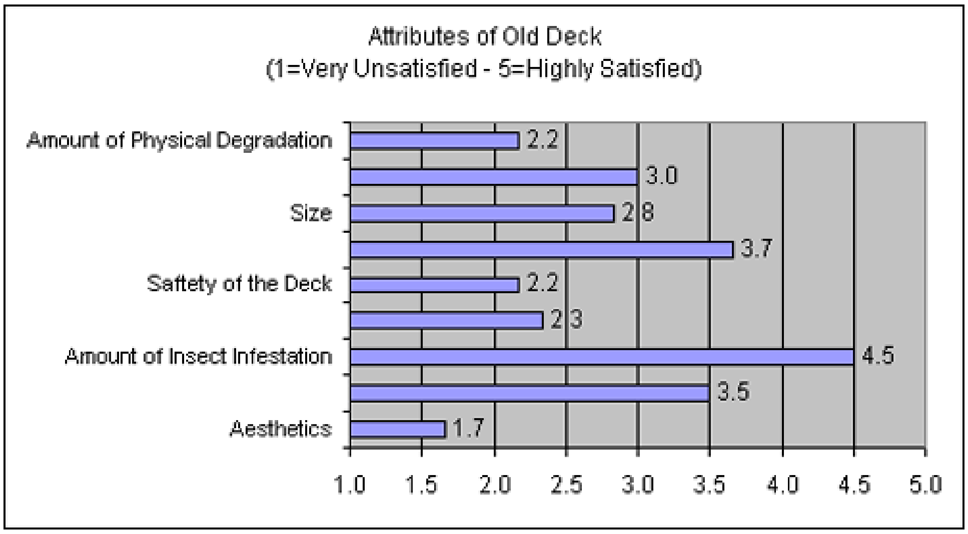

Figure 1. Deck owner's satisfaction level of removed deck attributes.

Table 4. Volume of wood recovered from individual decks.

CCA Treated Wood In-Serive and Recovered from Residential Decks (Bdft)				
	In-service	Recoverd	Difference	% Recovered
Deck #1	788	677	111	85.9
Deck #2	531	501	30	94.4
Deck #3	932	709	223	76.1
Deck #4	778	611	167	78.5
Deck #5	539	496	43	92.0
Deck #6	1078	992	86	92.0
Average	774	664	110	85.8

The material obtained from the decks is listed in Table 5. Since it is impossible to identify the function of each type of wood used in the deck (i.e., decking, joists, posts, etc.) after removal the application of the material, while in-service, is not listed in Table 5. Strong assumptions can be made that the 5/4"x6" RED and the 2"x6" is decking, the 2"x8" and 2"x10" are joists and the 4"x4" are posts. According to Table 5, the 2"x6" material was the highest volume of material received from decks and recovered. This is expected since the decks in this study consisted of 40% decking. The most successful materials recovered were the 2x8s and the 2x4s. The success of recovering the

Table 5. Recovered dimensional material from removed decks.

	Volume (bd.ft.)	% of Total	% Recovered
5/4x6	225	5.7	80.1
2x2	132	3.3	89.8
2x4	304	7.6	94.7
2x5	15	0.4	88.2
2x6	1633	41.1	91.9
2x8	810	20.4	94.0
2x10	396	10.0	85.5
2x12	49	1.2	31.8
1x6	117	2.9	48.1
4x4	274	6.9	81.5
lattice	21	0.5	39.6
Total	3976	100.0	85.4

2x8s, which were predominantly joists, is possibly due to the lack of exposure to weathering and physical wear. The fact that the 2x4s were recovered effectively is due to the ripping of wider material into 2x4s. It must be acknowledged that the volume of 2x4s was low and this might not be an accurate representation of the recovery success of this material. Only after obtaining a higher volume of 2x4s from a deck can that conclusion be stated.

Decks No. 3 and No. 4 were both deconstructed to determine if it would be beneficial in the recovery and recycling of CCA treated wood from residential decks. In order for the deconstruction process to be successful, a higher amount of CCA treated wood needs to be recovered from the spent residential decks. This increase in usable material will theoretically offset the increased time to deconstruct the deck. However, this research concluded otherwise. As shown in Table 4, the volume and percent of CCA treated wood recovered from Decks No. 3 and No. 4 are- much lower than the average. In fact, the average percent of recovered lumber from Decks No. 3 and No. 4 was 77.2% and from the remaining decks was 90.8%, the opposite of what was expected. The time to deconstruct Decks No. 3 and No. 4 were less than the time to demolish the other 4 decks in the study, which is also the opposite of what was expected.

There were many factors that influenced the success of deconstruction process of Decks No. 3 and No. 4. First, Deck No. 3 and 4 used more hardware then the average of the other decks, but what is more important it the type of hardware used. Most of the unrecoverable CCA treated wood from Deck No. 3 and No. 4 was from the railing components, and were fastened together using spiral shank nails. When the removal of hardware was attempted the nail heads snapped and the shank of the nail was imbedded into the wood, making it unfeasible to remove. Therefore, the use of hardware had a large impact on the recovery of Decks No. 3 and No. 4. The type and amount of hardware used could be more of a factor in successfully recovering CCA treated residential decks then just following deconstruction practices.

Chemical Properties

The AWPA Book of Standards (1984) was followed to obtain samples for chemical assay. The joists and decking of the six removed decks were tested along with recently treated 5/4x6 RED and 2x6 wood. In total, fourteen samples were tested. The treated wood samples were then analyzed for Arsenic (As_2O_5), Copper (CuO) and Hexavalent chromium (CrO_3) content using an Asoma x-ray fluorescence analyzer. Three replications were performed on each test to account for any errors during the test. There were enough samples to perform two separate tests from each fourteen samples, therefore a total of 28 chemical assays were completed.

A majority of retention levels from the chemical assay samples taken from the decking and joists of the residential decks were lower than the minimum standard required for recently treated wood, as shown in Figure 2. The chemical assay samples from the joists and decking from Deck No. 4 were above the minimum standards required by AWPA, as shown in Figure 3. Other than Deck No. 4, the decking samples used for chemical assay from Deck

No. 1 were the only samples-above the minimum retention, after preservative treatment, in lb/d. The retention level for Deck No. 5 was low, and the possibility of the samples being virginia pine or pond pine could have affected the retention level during the pressure treating process. The decking samples from deck No. 1 was also low and it was questioned whether the decking was treated to .25 lb/ft^3, instead of what was stamped on the lumber, which stated it was originally treated to .40 lb/ft^3.

The recently treated 2x6 samples had a chemical retention that was above the required limit, but the 5/4x6 samples were 20% below required minimum standards. The average retention of the eight chemical assay samples from the removed decks that were reported to be pressure treated at a minimum of .40 lb/ft^3 was .281 lb/ft^3, approximately 30% below the ‘level required retention after pressure treatment. The average of the four chemical assay samples tested that was originally pressure treated at a minimum chemical retention of .25 lb/ft^3 was found to be exactly equal.

The service time of the decks in this sample did not have an effect on the retention level. As seen in Figure 2 there appears to be no correlation between amount of time in service and retention levels lower than the minimum required. Other factors, such as the possibility of lower then required retentions during the pressure treatment process, and environmental conditions while the decks were in-service, could have had a larger influence on the retention of preservative treating chemicals.

Figure 2. Retention of CCA in joists and decking from removed decks and recently treated wood.

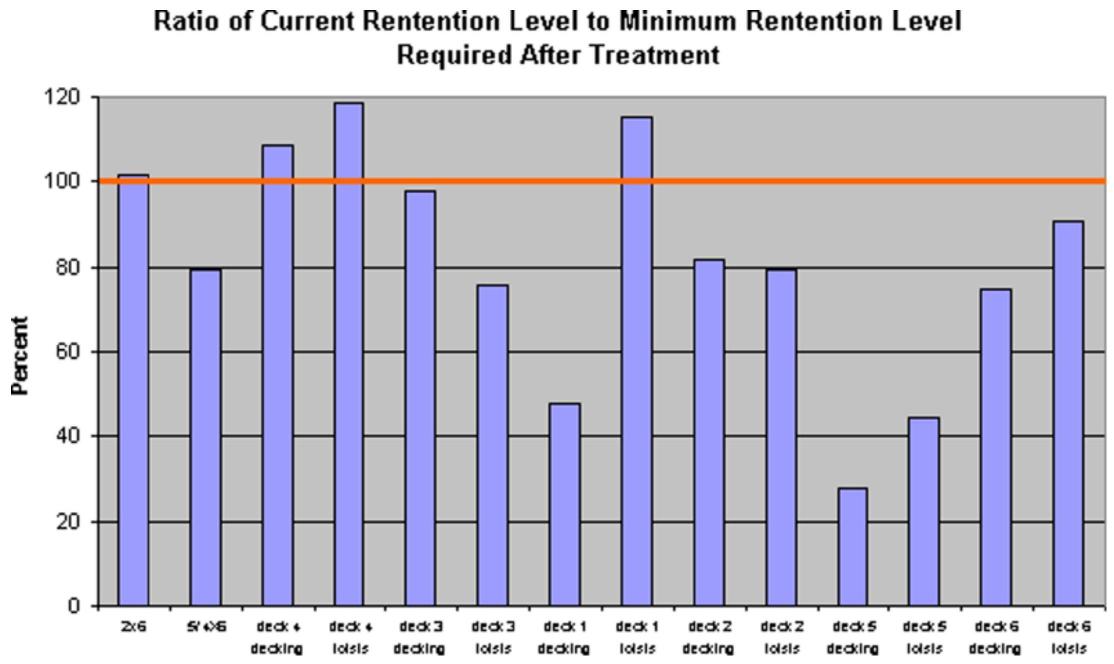

Figure 3. Ratio of minimum required at treatment and current retention of CCA.

From chemical analysis, the samples from the joists had, on average, a higher chemical retention compared to the samples from the decking of the six removed residential decks. The average retention of the chemical assay samples from the decking was .26 lb/ft^3, and was .301 lb/ft^3 from the joist samples. The joists chemical assay samples, on average, were approximately 87% of the original chemical retention after preservative treatment. The decking samples, on average, were approximately 73% of the original chemical retention after preservative treatment. Lack of physical and environmental exposure of the joists compared to the decking could have been factors in the difference in preservative chemical retention.

Mechanical Tests

Decking samples were collected from the six spent CCA treated residential decks. Thirty random samples from the decking of each deck and recently treated 2x6 and 5/4x6 RED were obtained, therefore there were 8 different sets, each containing thirty samples. Recently treated SYP 2x6 and 5/4 RED were tested because existing data regarding the strength values of the CCA treated wood could not be found for comparison. The samples were cut to a length of 30 inches and labeled, and were conditioned approximately 60 days to reach equilibrium moisture content of 12%. A testline Mechanical Testing System (MTS) was used to test the strength properties, and a test span of 24 inches was selected to match the maximum joist spacing allowed for Southern Yellow Pine 5/4 RED (SPIB, 1986). Pieces were tested in flatwise bending, to simulate the performance of the decking material 'in-service. The samples were tested in a third point loading system for two main reasons. The testing method followed was ASTM designation: D 198-99, *Standard Test Methods of Static Tests of Lumber in Structural Sizes* (ASTM, 2000a). If possible, the largest defect of the test samples were intentionally placed in the middle third of the load span. Load-deflection data was obtained from LabTech Control software, which then exported the data into Microsoft Excel, and the modulus of elasticity (MOE) and modulus of rupture (MOR) was calculated for each test sample.

After testing of the samples a failure description, if known, was recorded. The moisture content of the samples was determined, after mechanical testing, by determining the oven dry weight according to ASTM Designation: D 4442-92 (ASTM, 2000b). The moisture content of the samples was found to vary from 10% to 14%. In order not to make differing moisture contents a factor in comparing strength properties, ASTM designation: D 1990-00, *Moisture Adjustment Procedure For Development of Characteristic Values For Mechanical Properties of Lumber,* (ASTM, 2001c) was used to adjust all properties of the test data to a 15% moisture content. Also, the density of the samples in each set were assumed to be a normal representation of Southern Yellow pine, and therefore the specific gravity of the samples was not determined.

Differences in the average MOE and MOR values between spent decking material and recently treated material were evaluated. The mechanical properties of the spent 2x6 decking material was compared to the recently treated 2x6 material, and the spent 5/4x6 RED decking material was compared to recently treated 5/4x6 RED material.

The MOE values from Deck No. 2, No. 3, No. 4, and No. 5 were found to be statistically equal to the recently treated wood, and the values from Deck No. 6 were found to be greater, as shown in Figure 4. The MOR values from Deck No. 6 and No. 2 were the only decks found to be statistically equal to the recently treated 2x6s, as shown in Figure 5. The decking for Deck No. 1 was composed of 5/4x6 RED, therefore this material was compared to recently treated 5/4x6 RED. The average MOE values from deck No.1 was 1.2×10^6 psi, and 1.3×10^6 psi for the recently treated 5/4x6 RED, which were found to be statistically equal. The average MOR values for Deck No. 1 and the recently treated 5/4x6 RED was 6,263 psi and 7877 psi respectively, were found to be statistically unequal.

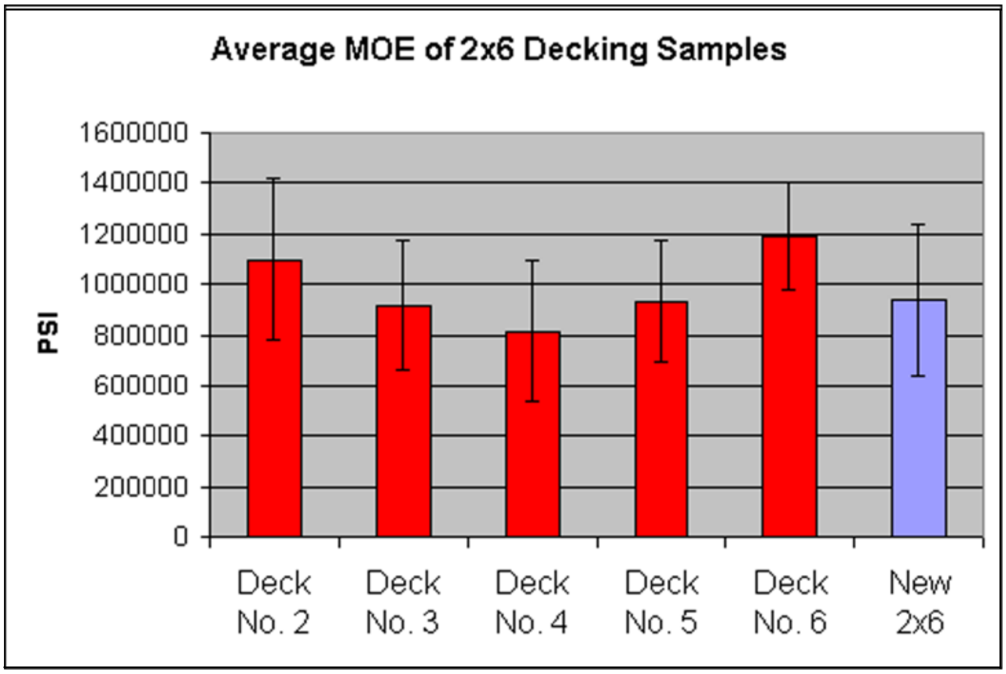

Figure 4. Average MOE values and distribution of 2x6 decking samples.

* Darker columns represent decking samples statistically equal or greater than recently treated 2x6s.

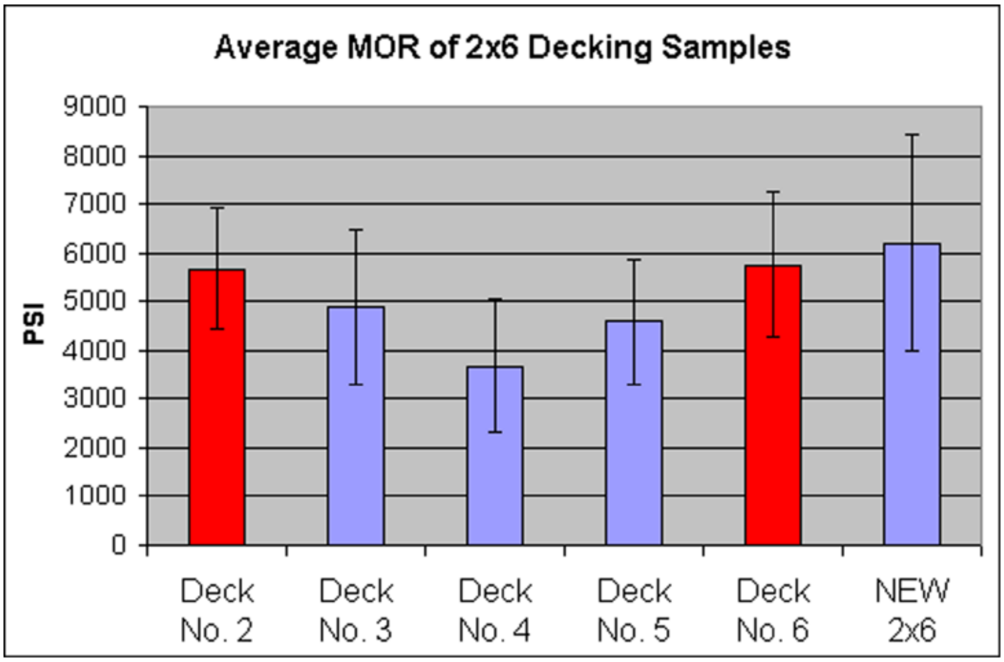

Figure 5. Average MOR values and distribution of 2x6 decking samples.

* Darker columns represent decking samples statistically equal or greater than recently treated 2x6s.

Products Manufactured

Products were manufactured from the recovered CCA treated wood of residential decks. Products were chosen that were practical, easily fabricated, required little carpentry training or skill, and a small number of fairly inexpensive tools. Table 6 displays the products made, material and hardware used, cost of the hardware, and man-hours needed to build the products. Several other products can also be made, including walking bridges, trail guides, signposts, and other landscaping components. Several products produced during this study are shown in Figure 6. The material used the most to produce these products was 2x4s, 2x6s and 1x6s. It was found that the highest recovered volume of a deck is 2x6 lumber; therefore it is beneficial that products can be made from this material. Feasible products that utilize 2x8 material or joists from old deck need to be found, in order to recycle the high volume of 2x8 lumber being removed from residential decks.

Table 6. Material, hardware, costs, and time needed to produce several products from recovered CCA treated wood.

Product	Material	Hardware	Cost of Hardware	Man-Hours
Porch Swing	2x4, 5/4x6	3-1/2" & 2" screws, 3-1/2" lag screws, 3-1/2" lag bolts	$8.68	2.5
Chair	2x4, 1x4	2-1/2" screws, 3-1/2" lag bolts, 3-1/2" lag screws	$8.71	3
Trash Container	1x4, 2x2, 1x6, Lattice	1-3/4" screws, 1-1/4" nails	$2.00	4
Trellis	2x6, 2x4, 4x4, 2x8, 2x2, 2x10	corner bracket, 5-1/2" lag screws, 3-1/2 lag bolts, 3" & 2-1/2" screws	$28.70	27
Planter Box	5/4x6	1-3/4" screws, 1-1/4" nails	$1.20	1.5
Planters	2x4, 1x4	3-1/2" & 2-1/2" nails	$0.60	2
Patio Table	4x4, 2x2, 1x4, 1x6	2" & 3" screws, 6" lag screws	$18.00	8
Picnic Table	2x6, 2x4	2-1/2" & 3" screws, 3-1/2" lag bolts	$18.31	8.5
Porch Railing	2x2, 2x4	all tread, 2-1/2" nails	$6.75	8.5
Deck	2x8, 5/4x6	joist hangers, 2-1/2" screws, 1-1/2" nails	$26.18	22
Saw Horse	2x6, 1x6	3-1/2" & 2-1/2" nails	$0.35	1.25
Block Pallets	1x4, 1x6, 5/4x6, 4x4	2-1/4" and 1-5/8" spiral shank nails	$9.66	2.25
Stringer Pallets	2x4, 1x4, 1x6	2-1/4" spiral shank nails	$5.04	1.75

Market Assessment

Interviews, either by phone or person, were conducted of landfill managers, recycling companies, and potential users of recycled material. The purpose was to identify barriers that exist for the waste management and recycling industries in the successful recovery and recycling of CCA treated wood. Six construction and demolition (C&D) landfill mangers, six municipal solid waste (MSW) landfill managers, six recycling center managers, and four organizations that purchase CCA treated wood were interviewed.

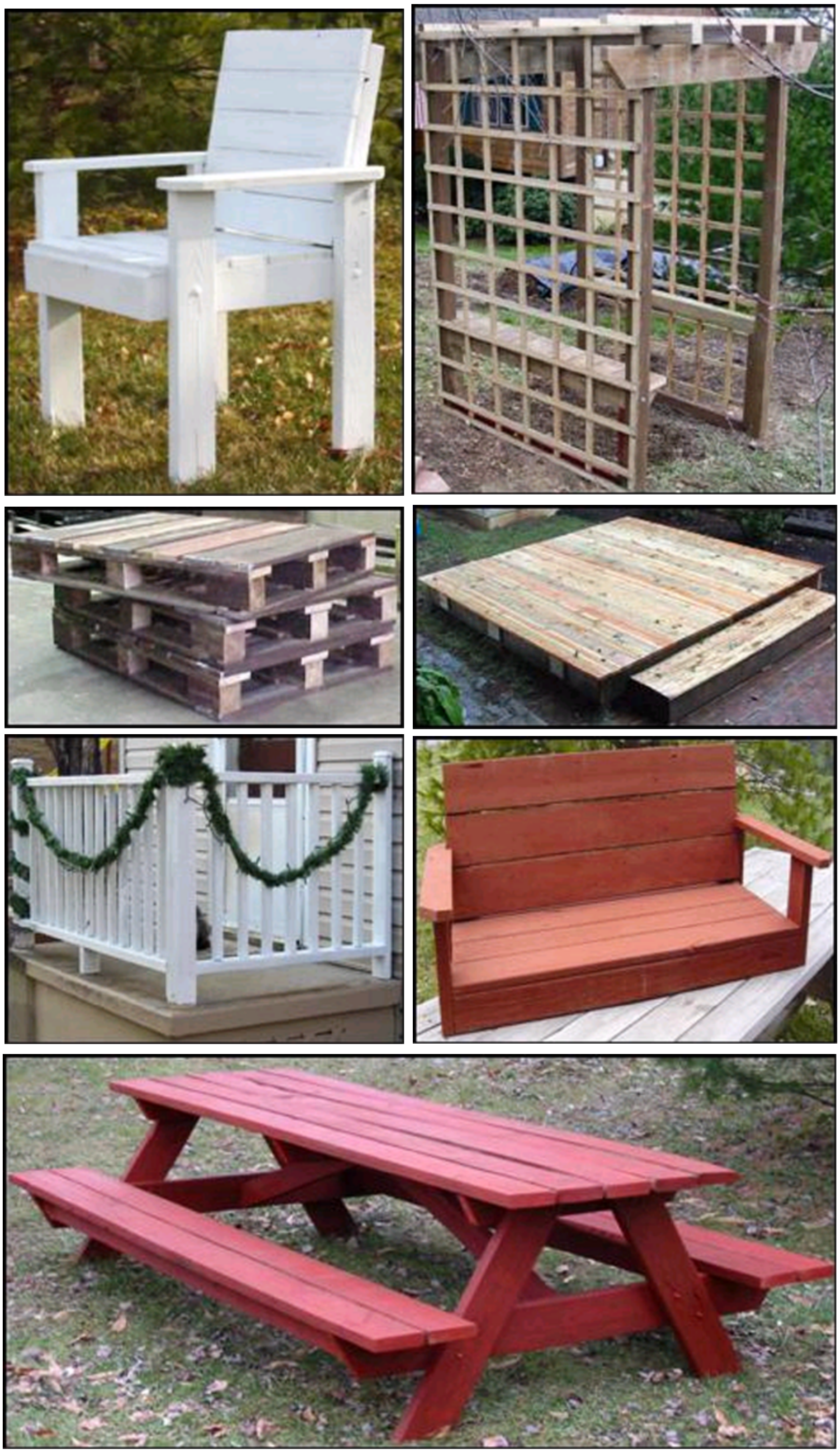

Figure 6. Products produced from recovered CCA treated wood. Outdoor chair (top left), Trellis (top right), Block Pallets (2nd row left), Deck (2nd row right), Railing (3rd row left), Swing (3rd row right), and Picnic Table (bottom).

Two of the six C&D landfills contacted separate CCA treated wood waste. The landfills that did separate it out stated that approximately 10% of the wood waste received was CCA treated. Most facilities did not recover CCA treated wood waste, because there was no market and therefore not cost effective to hire employees to separate the material. Most recycled “clean” wood waste went into mulch or boiler fuel. One facility did have employees on site that separate CCA treated wood, pull the nails and cut bad end off the lumber. The wood is then stacked and sold at cost to local citizens; although this material was mostly from new home construction, not demolished decks. The manager claimed it was very popular, and people used the material to repair decks and to build picnic tables and doghouses.

The MSW landfills managers answers were very similar to that of the C&D landfill managers. All stated that they receive CCA treated wood waste, except one who had a private company intercept the wood waste entering the facility and separated the wood waste that could be recycled and then sent the rest to the landfill. None of he facilities separated the CCA wood waste, but most charged less expensive tipping fees if the material received at the site was completely “clean” wood waste which was ground into mulch or boiler fuel or sold to companies that did so. They all concluded that the process to separate and recover CCA treated wood was too labor intensive and can not be profitable because they could not sell the material to justify the costs.

Three of the six recycling companies that were contacted recycled wood waste, but none recycled CCA treated wood waste. Most claimed they could easily produced similar products made in this study, but it would not be feasible. Many believe that they would not receive and adequate supply of raw material, and furthermore they were not aware of a potential market for the finished product that would purchase the material on a regular basis.

Several county and city parks and recreation departments were contacted to determine if they could use recycled CCA treated wood in their facilities. All the park managers claimed that they do not have a policy regarding the purchase of recycled material; rather they purchase the lowest priced material that will meet their specifications. They indicated they could use the material, but did not know how to get recovered CCA treated wood. They did not want to make the process of receiving CCA treated wood, as one manager stated, “a logistical nightmare”. Most park mangers said the potential use could be in trail guides, landscape timbers, bridges, benches, and shelves. The National park service stated that they could not use the material because they specify that the CCA treated wood used in their parks be treated to .60 lb/ft^3, which few residential decks have wood treated to that level. Habitat for humanity was also contacted, they claimed to be interested in using the material, and would also supply the labor in pulling nails and trimming the unusable ends. Most of the material wood be used in decks, railings, and porches of habitat homes.

Conclusions

As expected, the highest volume in the decks received was the decking and joists. Overall, it was found that 86% of the deck could be recovered as reusable lumber. It was found that the decking and joists were the most feasible components of the deck to recover. Deconstruction does not seem to increase the volume recovered from a CCA treated residential deck. Other factors, such as hardware type, exposure to extreme environmental conditions and location of the deck, play a larger role in the recovery of CCA treated wood from decks. This research concludes that the amount of CCA treated wood that can be recovered is much higher than previously believed.

Most of the chemical assays samples from the decking and joists resulted in lower than anticipated results. It should be noted that the low chemical retention of the assay samples does not mean that the treated wood in not reusable. Most of the samples used for chemical assay were above .25 lb/ft^3 which is the minimum required for above ground contact applications for CCA treated wood; therefore much of the CCA treated wood coming out of service in residential decks can be used in above ground applications.

The stiffness of the decking material was found to be statistically equal to that of recently treated wood; however the bending strength of the removed decking was lower overall than the recently treated wood. A theory for this phenomenon is that physical and climatic degradation or nail holes could have induced flaws that reduced the bending strength of recovered wood when compared to recently treated wood.

Several products can be made, that do not require much time, monetary investment, or training. However many landfills and recycling centers do not find it feasible to recover the material because there are no identifiable markets for the recovered wood. Several potential users have expressed interest in the material, but do not know where to get the material. There seems to be a lack of communication between landfillers, recyclers, and potential users of discarded CCA treated wood. Government programs that will educate and inform the three groups (landfillers, recyclers, and users), concerning the issues and potential uses of recovered CCA wood, could break the commutation barrier that exists in recycling CCA treated wood.

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