

Extent of CCA-Treated Wood in Consumer Mulches

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Abstract:

Preliminary studies have shown that some commercially available mulches leach excessive amounts of arsenic. The objective of this ongoing study is to determine the extent to which the consumer purchases mulch that is contaminated with CCA-treated wood in Florida. The study also focuses on determining the effectiveness of visually inspecting the mulch for CCA. Once collected, samples are analyzed two different ways. First, the wood is visually inspected for the presence of engineered, and/or dimensional wood. Second, two sub-samples are processed for chemical analyses. One of those sub-samples is ashed, digested and analyzed for total recoverable metals, to determine the fraction of CCA-treated wood within each mulch sample. The second sub-sample is subjected to a SPLP test to determine the amount of leachable arsenic, chromium, and copper. To date 35 samples have been subjected to the SPLP test and 20 samples have been ashed, digested, and analyzed for metal content. Results to date show that some of the samples are positive for arsenic. Of the 35 samples subjected to the SPLP test, 15 tested positive for arsenic. The concentrations ranged from 13 to 167 µg/L, with 9 samples exceeding the current groundwater cleanup target level for arsenic of 50 µg/L. Mulches with arsenic in the higher concentrations were red mulches, several of which were found in playgrounds. Of the 20 samples ashed, digested and analyzed, 8 tested positive for arsenic. The arsenic concentrations ranged from 4 to 196 mg/kg. These concentrations exceed Florida's soil cleanup target levels which are 0.8 mg/kg for residential areas and 3.7 mg/kg for industrial areas. Of the 8 positive samples, 7 were red colored. Two of the positive red mulches were collected from playgrounds. All of the red mulches contained plywood which indicates that the mulch was made from recycled dimensional wood. More results are pending and a final report will be released during the Fall of 2004.

Introduction:

The potential for recycled C&D wood to contain CCA-treated wood has been well documented. Recycled C&D wood can be used in the production of mulch which means that CCA-treated wood can end up in consumer mulches. C&D wood used for mulch is often dyed (red) to mask its typical grayish color associated with recycled C&D wood. However, red mulch has become so popular that even wood made from virgin vegetative wood is now available in dye-enhanced colors.

The objective of this study is to determine the extent to which commercially available mulches are contaminated with CCA. The goal is to collect samples from retail stores, plant nurseries, and local playgrounds or schools within Florida. These samples were then inspected and analyzed to determine which samples contained chromium, copper, and arsenic.

Methods:

Sample Collection

•Samples were collected from retail establishments and plant nurseries. Samples were also collected from landscape uses including use within playgrounds. Controls consisting of untreated wood and CCA-treated wood at known retention levels were included within the analysis.

Sample Pre-Processing

•Visual inspection for evidence that it came from C&D wood. This includes inspection for the presence of engineered wood such as plywood, particleboard, and painted wood.

•Evaluate wood-chip size-distribution.

•Ash a sub-sample of the mulch in the laboratory.

Sample Chemical Analysis

•For every mulch sample collected, a set of paired processed sub-samples is made. A sub-sample of unburned mulch and a sub-sample of ashed mulch.

•The unburned mulch sample was subjected to standard SPLP (Synthetic Precipitation Leaching Procedure) to determine the amount of leachable arsenic, chromium, and copper.

•The ashed samples were digested and analyzed for the same metals. The ashing step was needed to determine the fraction of CCA-treated wood within each mulch sample.



The picture to the right shows engineered wood (plywood) found in mulch at a playground.

Results:

Table 1

Sample ID	Mulch Color	Plywood	As (mg/kg)
10	Red	Yes	196
4	Red	Yes	118
6	Red	Yes	69
7	Red	Yes	68
14*	Red	Yes	112
13*	Red	Yes	150
26	No Coloring	No	19

Of the 20 samples ashed and analyzed, 7 mulch samples tested positive for arsenic. The above table shows whether or not the mulch was colored, the amount of arsenic found in the positive samples, and whether or not engineered wood was found in the sample. * indicates sample retrieved from park.

Table 2

Sample ID	Mulch Color	Plywood	Arsenic (µg/L)
1	Red	Yes	13
4	Red	Yes	135
6	Red	Yes	130
7	Red	Yes	63
10	Red	Yes	157
12*	Red	Yes	117
13*	Red	Yes	167
14*	Red	Yes	90
11*	No Coloring	No	145
23	No Coloring	No	14
26	No Coloring	No	73.5
CCA Control Mix	No Coloring	No	2160
0.25pcf Control	No Coloring	No	3317

Of the 35 samples subjected to the SPLP analysis, 13 samples tested positive for arsenic. The above table shows whether or not the mulch was colored, the amount of arsenic found in the positive samples, and whether or not engineered wood was found in the sample. * indicates sample retrieved from park.

Figure 1

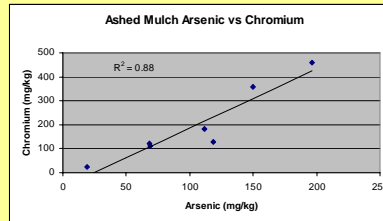


Figure 1 shows the results from the ashing test. There is nearly twice as much chromium as arsenic. The presence of both arsenic and chromium indicates CCA-treated wood was mixed in.

Figure 2

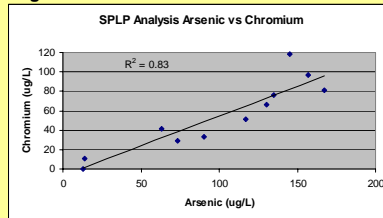


Figure 2 also shows a correlation between arsenic and chromium.



The above picture shows a pile of C&D wood waiting to be mulched. Next to it is a pile of mulch.

Figure 3

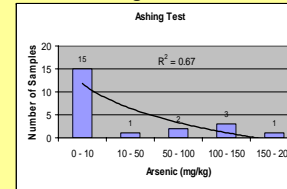


Figure 3 shows how many ashed samples are in a given concentration range.

Figure 4

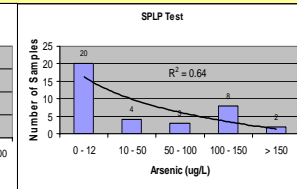


Figure 4 shows how many samples subjected to SPLP analysis are in a given concentration range.

Figure 5: Make up of samples ashed

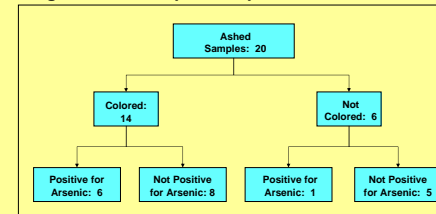
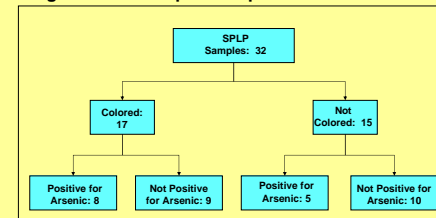


Figure 6: Make-up of samples under SPLP test



Conclusion:

Results have shown that some of the samples were positive for arsenic. Of the 35 samples subjected to the SPLP test, 13 tested positive for arsenic. The concentrations range from 13 to 167 µg/L. The current groundwater cleanup target level for arsenic is 50 µg/L. Nine of the 35 samples (not including the controls) exceeded the 50 µg/L level. Of the 20 samples ashed, digested and analyzed, 8 tested positive for arsenic. The arsenic concentrations ranged from 4 to 196 mg/kg. These concentrations exceed Florida's soil cleanup target levels. Florida's soil cleanup target levels range from 0.8 mg/kg for residential areas and 3.7 mg/kg for industrial areas. Of the 7 positive samples, 6 were red colored and contained engineered wood. Two of the positive red mulches were collected from playgrounds. Since all of the red mulches contained plywood, at least a portion of that mulch was made from recycled dimensional wood. The results of this study to date indicate that some mulches at retail establishments, in particular red colored mulches, contain CCA-treated wood. These contaminated mulches may then be unknowingly purchased by the consumer.