

Technical Bulletin No. 501

Short-Term Personnel Monitoring for Chromium during Cutting and Drilling of CCA-C Treated Marine Piling and Utility Poles

Marine contractors and utility workers occasionally need to cut off a section or drill a bolt hole into a pile or pole. The cuts are usually made with a chain saw, and the holes are typically drilled with a $5/8 - 3/4$ " auger bit. To determine exposure to chromium, five-foot-long sections of CCA-C treated southern pine piling (2.5 pounds per cubic foot [pcf]) and poles (0.6 pcf) were obtained from commercial wood treating facilities. Representative samples of the material were analyzed for retention and shown to be in conformance with the American Wood-Preservers' Association (AWPA) Standards (C-3 and C-4) [1].

In an effort to simulate a worse case scenario of this type of cutting/drilling activity, short-term (10 minute) personnel monitoring was performed while an individual repeatedly cut disks (17 to 30 disks per period) from CCA treated piling and poles using a Poulan 2.8 cubic inch chainsaw with an 18" bar. Drilling activities were simulated with the use of an electric powered drill using a $3/4$ " auger bit. In each ten-minute run, the number of holes drilled in the CCA treated piling and poles ranged from 10 to 20.

A total of ten individual runs utilizing two MSA Escort Efl sampling pumps were performed. Both pumps were calibrated before use and operated at two liters per minute. One pump was used solely to collect *hexavalent* chromium samples with the samples collected on polyvinyl chloride (PVC – 5 μ g) membrane filters in accordance with OSHA Method ID-215. A second pump was used solely to collect *total* chromium samples, and the samples were collected on mixed cellulose ester membrane filters. All samples, including two blanks, were sent with a chain of custody form to an outside analytical laboratory for *hexavalent* and *total* chromium analysis in accordance with OSHA Method ID-215 and NIOSH Method 7300, respectively.

As shown in the table that follows, the calculated time-weighted average (TWA) of $0.01 \mu\text{g}/\text{m}^3$ from each of the ten short-term runs demonstrates that the limited cutting and drilling activities associated with marine and utility use of CCA treated wood is several orders of magnitude below OSHA's proposed action level of $0.5 \mu\text{g}/\text{m}^3$ for *hexavalent* chromium. Similarly, the calculated TWA for total chromium exposure was less than $1.04 \mu\text{g}/\text{m}^3$ which compares with the OSHA TWA of $500 \mu\text{g}/\text{m}^3$ [2]. Moreover, the retention or amount of CCA per cubic foot of treated wood in the marine piling used in this study represents the highest retentions specified for CCA-C by the AWPA.

[1.] AWPA, P.O. Box 388, Selma, AL 36702-0388 • website: www.awpa.com

[2.] 29 CFR 1910.1000 Table Z-1

Results of Hexavalent and Total Chromium PEL Monitoring

Piling								Hexavalent Chromium			Total Chromium		
Run	Source	Retention ^a	Diameter	Moisture Content	Total Run	Activity	Disks Sawed or Holes Drilled	Concentration (μg)	Exposure (μg/m ³)	Estimated 8-hr TWA (μg/m ³) ^c <i>Proposed OSHA action level = 0.5</i>	Concentration (μg)	Exposure (μg/m ³)	Estimated 8-hr TWA (μg/m ³) ^d <i>OSHA TWA = 500</i>
1	PI #1	3.0 pcf/2.6 pcf	10"	33.30%	10 min.	Sawing	17	<0.011	<0.55	<0.011	<1	<50	<1.04
2	PI #1	3.0 pcf/2.6 pcf	10"	33.30%	10 min.	Drilling	10	<0.011	<0.55	<0.011	<1	<50	<1.04
3	PI #2	2.9 pcf/2.3 pcf	10"	23.60%	10 min.	Sawing	22	<0.011	<0.55	<0.011	<1	<50	<1.04
4	PI #2	2.9 pcf/2.3 pcf	10"	23.60%	10 min.	Drilling	20	<0.011	<0.55	<0.011	<1	<50	<1.04
5	PI #6	3.2 pcf/3.0 pcf	10"	31.70%	10 min.	Sawing	18	<0.011	<0.55	<0.011	<1	<50	<1.04
6	PI #6	3.2 pcf/3.0 pcf	10"	31.70%	10 min.	Drilling	17	<0.011	<0.55	<0.011	<1	<50	<1.04

Poles								Hexavalent Chromium			Total Chromium		
Run	Source	Retention ^b	Diameter	Moisture Content	Total Run	Activity	Disks Sawed or Holes Drilled	Concentration (μg)	Exposure (μg/m ³)	Estimated 8-hr TWA (μg/m ³) ^c <i>Proposed OSHA action level = 0.5</i>	Concentration (μg)	Exposure (μg/m ³)	Estimated 8-hr TWA (μg/m ³) ^d <i>OSHA TWA = 500</i>
7	PO #1	0.88 pcf	8 1/2"	99.90%	10 min.	Drilling	18	0.012	0.6	0.012	<1	<50	<1.04
8	PO #2	0.83 pcf	8 1/2"	99.90%	10 min.	Sawing	30	<0.011	<0.55	<0.011	<1	<50	<1.04
9	PO #4	0.63 pcf	8 1/2"	99.90%	10 min.	Sawing	21	<0.011	<0.55	<0.011	<1	<50	<1.04
10	PO #6	0.79 pcf	8 1/2"	99.90%	10 min.	Sawing	30	<0.011	<0.55	<0.011	<1	<50	<1.04

^a Piling assay zones are 0 - 0.5" and 0.5" - 2.0".

^b Pole assay zones are 0.5" - 2.0"

^c 8-hour time-weighted average (TWA) was calculated based on no further exposure to hexavalent chromium for the remainder of the work shift, per OSHA practice.

^d 8-hour time-weighted average (TWA) was calculated based on no further exposure to total chromium for the remainder of the work shift, per OSHA practice.

Comments:

Reporting limit for Hexavalent Chromium – 0.011 μg; using OSHA Method ID-215.

Reporting limit for Total Chromium – 1 μg; using NIOSH Method 7300.

PI = southern pine piling supplied by Wood Preservers, Inc., Warsaw, VA.

PO = southern pine poles supplied by Ace Pole, Waycross, GA.

Pole moisture content reflects outside storage during period of heavy rainfall.

Moisture content was taken at 1" depth utilizing a Delmhorst J-2000 moisture meter.

**Conducted at Arch Wood
Protection, Inc., Conley, GA**

Monitoring Date: 12/10/04

Weather Conditions: Partly cloudy, breezy,
53°F at start