



**REPORT ON ARSENIC RESIDUES IN
BASE MATERIALS OF PLAYGROUNDS
WITH CCA-TREATED WOOD
(Vancouver Parks)**

Vancouver Coastal Health Authority
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ARSENIC RESIDUES IN BASE MATERIALS OF PLAYGROUNDS WITH CCA-TREATED WOOD

EXECUTIVE SUMMARY:

Analysis of sand beneath 70 playgrounds within the Vancouver Coastal Health Authority in the spring of 2003 revealed that the vast majority of playgrounds with CCA-treated wood had levels of arsenic well below the 12 ppm Federal guideline and generally at or close to background arsenic levels in native soil.

PURPOSE:

The purpose of the study was to determine levels of arsenic in the soil/sand in playgrounds containing CCA treated wood, either as play equipment or borders. The results were evaluated against the Canadian Council of Ministers of the Environment (CCME)'s reference level of 12ppm and the B.C. Contaminated Sites Regulation limit for residential/park use of 100ppm.

STUDY DESIGN:

The study design (Appendix A) was drafted prior to the sampling commencing in the spring of 2003. The study design was reviewed by academics at UBC's School of Occupational and Environmental Health and adjustments were made based on their comments.

SCOPE:

The population surveyed included all schools, parks, and daycare playgrounds within the VCHA boundaries (except Bella Coola/Bella Bella) with CCA-treated wood and soil/sand as a base material. It was estimated that there were as many as 500 playgrounds within VCHA that contain at least one piece of equipment made of CCA-treated wood. The target sample size was therefore limited to ~ 20% of the total sites in Vancouver, Richmond, North Shore, and Coast Garibaldi. The actual number of playgrounds sampled (70 representing 15% of the total) was lower than the target, primarily because the student samplers found that many playgrounds (especially schools) were using pea gravel as a base rather than sand. The breakdown of playgrounds surveyed by Health Service Delivery area is:

Coast Garibaldi:	9
Richmond	12
North Shore	21
Vancouver	28

METHODOLOGY:

Sampling was carried out by BCIT Environmental Health students who were participating in their practicum with VCHA. An orientation session was held for the students, which included background information, sampling methodology and lab requirements, labelling and a data survey sheet for information gathering. The students also visited a playground in West Vancouver to familiarize themselves with the sampling procedures.

At each site at least 3 samples were taken. Initially one sample (near a vertical CCA-treated post) was sent in for analysis from each playground and identified as sample #1. The remaining

2 samples from each playground were held and only submitted if the #1 sample contained arsenic levels of 12 ppm or higher. In addition a background sample of native soil was taken at approximately 10% of the sites. For the Coast Garibaldi area, a decision was made to submit background samples for all of the sites because of the naturally occurring high arsenic levels in some areas of the Sunshine Coast and the distances between the sites.

A limited amount of sampling of pea gravel was also done from one school site in Vancouver. The laboratory analysis of arsenic levels on pea gravel does not lend itself to a direct comparison with the CCME guidelines

A total of 96 samples were submitted for analysis, consisting of 17 “background” reference samples and 79 samples of sand from below playground equipment or next to CCA-treated landscape timber borders.

RESULTS:

Results are provided for playgrounds in Vancouver Parks only. The highest background level reported was 5 µg/g (5 ppm) with an average of 4.4 µg/g. The highest arsenic level in sand was 10 µg/g with the overall average being 4.4 µg/g, or equivalent to the background average. There were no exceedances (0%) of the 12 ppm CCME guidelines for arsenic in soil. Table 1 lists the results for Vancouver Parks, including background samples. A separate report will be released by VCHA covering all of the playgrounds sampled within the health authority.

Table 1 – Levels of Arsenic (As) in Sand and Native Soils

Municipality	Location (Type)	As in Sand	Other Samples	Background
Vancouver	Almond Park	4		
Parks	Balaclava Park	4		
	Chaldecott Park	5		
	Charleston Park	6		
	Douglas Park	3		
	McSpadden Park	3		
	Maple Grove Park	7		
	Memorial Park West	3		4
	Moberley Park	4	2 / 6	4
	Tatlow Park	2		
	McBride Park	10		
	Kitsilano Beach	4		
	Hume Park	3		
	Slocan Park	2		
	Langara Park	4		
	Parkside Park	4		
	Mt Pleasant Park	5		4
	Sunset Park	5	7 / 4	5
	Ross Park	5	3 / 5	5
<i>Vancouver Park Averages</i>		4.4		4.4

DISCUSSION:

A mid-2003 study of base material done for Toronto Health of 268 playgrounds at parks and childcare centres found that 32 (12%) exceeded the 12µg/g CCME guidelines, 16 (6%) exceeded the Ontario MOE background guideline of 17µg/g and 11 (4%) exceeded the MOE residential/parkland criterion of 20 µg/g. The Toronto study recommended that, for those structures where soil arsenic levels exceeded the CCME guideline of 12µg/g, the CCA-treated wood components be sealed and that the resilient material within 1 metre of the structure be completely removed and replaced.

Similar to the Toronto study, results for the 3 Vancouver park spaces included in the Environmental Defense Canada study were markedly lower than the EDC study. Conversations with the EDC sampler indicated that their sample at Sunset Park was taken from almost precisely the same location as our sample (based on photo comparisons). Their result was 20.6 µg/g while our result was 5 µg/g. It appears that the EDC sampler removed all of the resilient material (sand) and actually sampled the native soil beneath the resilient surface. Our sampler was instructed to take a sample of the actual resilient material at a depth of 5 to 10 cm. We feel that this sample more accurately represents the potential exposure that children using the playground would experience. If the sampling procedure for the EDC study (i.e. removal of resilient material and sampling of underlying soil) was utilized consistently in their January cross-Canada study, it may well explain the disparities between EDC results at the results of the recent Vancouver and Toronto studies.

In summary, none of the playgrounds tested contained sand with levels above the CCME guidelines, and, on average the playground levels were the same as the background levels for native soil.

RECOMMENDATIONS:

Based on these low results, Vancouver Coastal Health is not requiring or recommending any additional risk reduction measures beyond those currently underway. The following points reiterate what would be regarded as prudent measures given the phase-out of CCA treated wood for playground uses.

1. Given the voluntary removal (effective December 31, 2003) from the market of CCA-treated wood for use in playgrounds, playground providers should not be acquiring or installing any new CCA-wood playgrounds (i.e. from any remaining stock).
2. The planned replacement of CCA-treated wood equipment should continue in an orderly fashion as budgets permit.
3. Sand should continue to be topped up (with clean sand) to provide the recommended depth of resilient surface and to discourage any contact with native soil.
4. Alternate resilient surfaces (e.g. artificial mulch) should be evaluated as options to sand.
5. For new equipment acquisitions, some of the currently available alternates (ACQ or Copper Azole) do not appear to have the same drawbacks as CCA (i.e. they do not contain arsenic) and are currently available in manufactured playgrounds. Since these

products do not have as long a history of use as CCA, we cannot yet conclude that their use is absolutely free of any health risks. Nevertheless, the ACQ product has received endorsements from the EPA as a suitable replacement treatment for CCA. Further study by the Pest Management Regulatory Agency and the EPA should confirm their safety profile.

APPENDIX A
STUDY DESIGN
Study of Playgrounds in VCHA to Determine Levels of Arsenic in Surface Soil/Sand
Beneath CCA-treated Wood Structures

SCOPE: The survey population will include all school, park and daycare playground with CCA-treated wood components within the VCHA. It is estimated that there may be more than 500 playgrounds with at least one CCA-treated structure within VCHA, the vast majority in Vancouver. (~60 in CG; ~ 70 in Richmond; ~ 100 in North Shore; ~ 270 in Vancouver).

The scope of the sampling will initially be limited to a randomly-selected subset of the total population of CCA-treated structures, consisting of not less than 20% of the total (e.g. 100 playgrounds) in any of the sub-areas. The subset may be stratified across the 3 types of playgrounds (school, park and daycare) and by age (if possible).

PURPOSE: The purpose of this study is to determine levels of arsenic in soil and sand surfacing material in playgrounds containing equipment (or borders) treated with Chromated Copper Arsenate (CCA). The numerical sample results will be evaluated against the arsenic standard for residential/park uses, contained in the B.C. Contaminated Sites Regulation (100 ppm), as well as being compared against the CCME's reference level of 12 ppm.

METHODOLOGY:

Sampling will be conducted by BCIT practicum students in early April, 2003. All samplers will receive an orientation on sample collection methodology in late March.

Sampling of surface cover (sand and soil) will be based on a draft EPA sampling methodology for surface soil.

Samples will be submitted to ALS Laboratories in Vancouver. Analysis will follow the B.C. CSR methodology, which will also comply with the CCME criterion.

Three samples will be taken at each of the selected playgrounds. The first will be taken at the base (within .5 m) of a CCA-treated upright structure of the playground equipment. A second sample will be taken near the middle of the CCA-treated playground and a third sample at a randomly chosen location between the first and second sample. All samples will be taken at a depth of 5 to 10 centimetres.

Only the first sample will be submitted to the laboratory for analysis, with the other two being securely stored for future analysis. Should the first sample result exceed 12 ppm, the remaining samples for that site will be submitted for analysis. The results will be reported separately and as a composite result. The benefit of this approach is that only those playgrounds with an initial level over 12 ppm (the Health Canada guidance level) will be re-sampled, thereby reducing the analytical costs.

Sampling time (based on an initial sampling run) should average 15 minutes/playground.

LIMITATIONS:

Several limitations to this study have been identified.

Playgrounds with “pea gravel” or mulch resilient surfaces will not be sampled as part of this survey as the lab analysis will not yield results which are directly comparable to the sand samples.

Samples taken on single dates may not be representative of the year-round exposure levels.

Interpretation of the results will be challenging given the difference between the CCME “guidance” level of 12 ppm and the BC CSR matrix level of 100 ppm.

CONTROLS and BACKGROUND:

Ten percent of the sampled playgrounds should be sampled with a background sample of the native soil (close to the playground) to determine background levels of arsenic.

A limited number of samples of the original resilient material (e.g. sand) provided by the supplier will also be taken for analysis.

ANALYSIS:

All samples will be packaged in appropriate containers provided by ALS Labs and delivered to the lab in a timely manner.

Samples will be analyzed by ALS Labs utilizing procedures that meet BC CSR protocols and, by extension, CCME criteria.

REPORTING:

Once all results are in, VCHA staff will analyse and compile the results and provide accompanying risk assessment commentary. From a risk reduction perspective the authors of the final report will utilize the 100 ppm BC CSR standard as a regulatory action level, but will also compare results against normal background levels and the CCME/Health Canada reference level. The final report will not delve into risk management approaches, as these will be the subject of local discussions with Park, School Board and daycare staff.

References:

A Set of Scientific Issues Being Considered by the Environmental Protection Agency Regarding: Preliminary Evaluation of the Non-dietary Hazard and Exposure to Children from Contact with Chromated Copper Arsenate (CCA)-treated Wood Playground Structures and CCA-contaminated Soil.

SAP Report No. 2001-12, FIFRA Scientific Advisory Panel Meeting, October 23- 25, 2001, held at the Sheraton Crystal City, Hotel, Arlington, Virginia

Canadian Soil Quality, Guidelines for Contaminated Sites, Human Health Effects: Inorganic Arsenic, Final Report; The National Contaminated Sites Remediation Program, February 1995