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Flame Retardants in Children's Tents, Play Tunnels, and Upholstered Chairs

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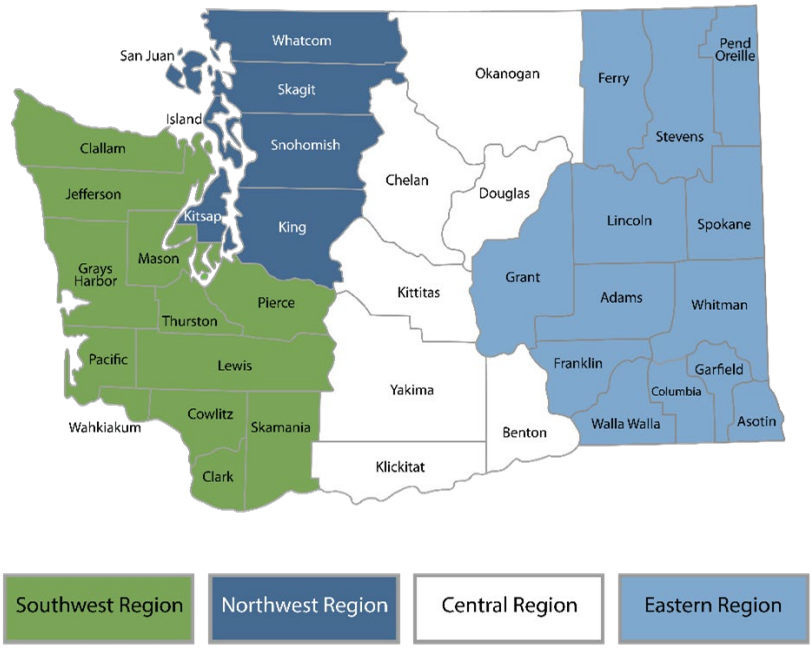

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Flame Retardants in Children's Tents, Play Tunnels, and Upholstered Chairs

by
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Abstract

In 2016 the Washington State Department of Ecology (Ecology) analyzed the presence of 10 flame retardant chemicals in children's upholstered furniture, play tents, and tunnels. These product categories were selected as they are associated with performance-based flammability standards. Recently, the California standard associated with upholstered furniture was updated to meet less stringent requirements. Before this update, manufacturers often met the standard using concentrations of flame retardants at the percent level. Our goal was to find out if the frequency and use of flame retardants in children's upholstered chairs and sofa products sold in Washington decreased with this update.

We also wanted to find out the frequency and level of flame retardants in children's play tents and tunnels to see if there was a link between the use of flame retardants and the use of a camping tent flammability requirement label.

Methods

We collected 85 children's products from 18 retailers in Washington State and online between February and March 2016. We used x-ray fluorescence (XRF) to screen these products for bromine and antimony. This method helped identify which parts (components) of a product likely contained brominated flame retardants and antimony trioxide, which is frequently used with brominated or chlorinated flame retardants.

This study also assessed an analytical method for phosphorous for use as a screening method to help identify organophosphate flame retardants. This method appeared effective for screening upholstered furniture samples but not for tent and tunnel samples.

Components were then selected and sent to the laboratory for flame retardant analysis.

Results

Components from 17 products (7 upholstered furniture, 10 tents) contained 1 or more of the 10 flame retardants investigated. Components from 15 products (7 upholstered furniture, 8 tents) contained flame retardants at a level that indicated they were intentionally added. The flame retardant that was most commonly found was:

- Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)

Other flame retardants that were detected were:

- Tris(1-chloro-2-propyl) phosphate (TCPP)
- Tris (2-chloroethyl)phosphate (TCEP)
- 2,2-bis(chloromethyl)propane-1,3-diyl-tetrakis(2-chloroethyl)bis(phosphate) (V6)
- Flame retardants in the mixtures Firemaster 550 and 600

The following were not detected:

- Resorcinol diphenyl phosphate (RDP)
- Hexabromocyclododecane (HBCD)
- Tetrabromobisphenol-A (TBBPA)

Several fabric samples screened positive for phosphorous or bromine yet did not contain any of the 10 flame retardant chemicals in this study. It is likely they contained other flame retardants that we did not include in this study.

We submitted the samples containing TDCPP and TCEP, which are listed as chemicals of high concern to children (CHCC), to compliance staff to determine if they meet the CSPA reporting requirements from 2011.

Introduction

After the phase out of polybrominated diphenyl ethers (PBDEs), a number of alternative flame retardants have been identified in products (Stapleton 2012, Ballesteros-Gómez 2014, EPA 2017). Two of these alternative flame retardants were listed as CHCCs in 2011. TDCPP and TCEP are required to be reported by manufacturers when found in certain children's products purchased in Washington. In 2016, after this project plan was initiated and samples were purchased, CSPA was updated to include new limits and reporting requirements for additional flame retardants. These limits and additional requirements took effect in 2017 and therefore do not apply to the samples purchased in this study.

Some background on flame retardant use in upholstered furniture and tents and regulatory changes that occurred prior to the start of this study are provided for context.

Flame Retardants in Upholstered Furniture and Tents

Furniture:

With the phase-out of PBDEs, flame retardant use in upholstered furniture has switched from the penta-brominated diphenyl ether (penta-BDE) formulation to other brominated and organophosphate flame retardants. Common alternative flame retardants are:

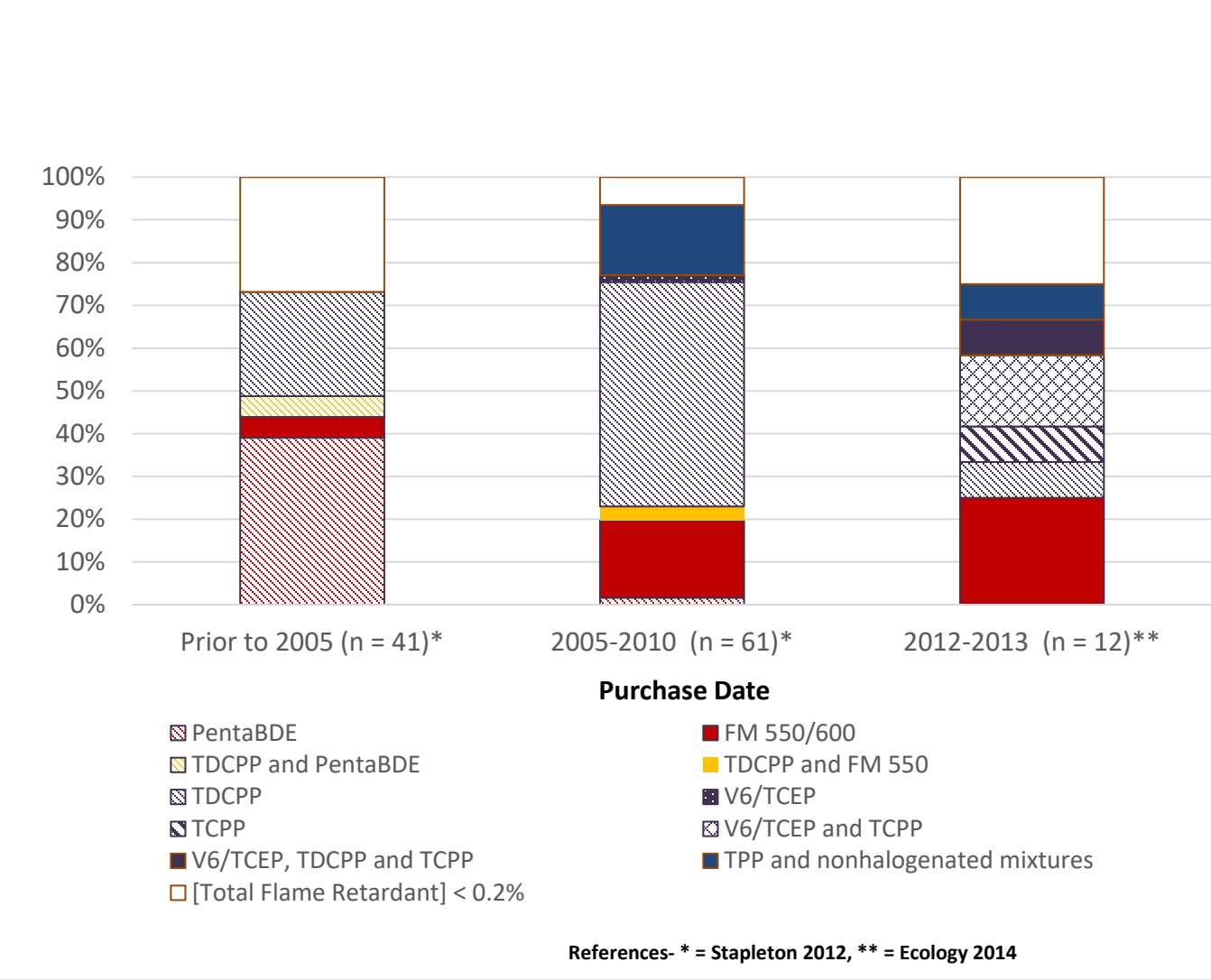
- Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)
- Firemaster® 550 (FM 550) mixture, which contains these flame retardants:
    - 2-ethylhexyl 2,3,4,5-tetrabromobenzoate (TBB)
    - (2-ethylhexyl) tetrabromophthalate (TBPH)
    - Triphenyl phosphate (TPP) (Stapleton, 2011, 2012)

Additional flame retardants detected in furniture foam are:

- Tris(1-chloro-2-propyl) phosphate (TCPP)
- 2,2-bis(chloromethyl)propane-1,3-diyl-tetrakis(2-chloroethyl)bis(phosphate) (V6)
- Tris (2-chloroethyl)phosphate (TCEP), which is frequently associated with V6,
- Firemaster® 600 mixture, which contains these flame retardants:
    - TBB
    - TBPH
    - Nonhalogenated organophosphate flame retardants including TPP (Stapleton 2012)

An Ecology flame retardant study that purchased products in 2012-2013 found similar results (Ecology 2014). In that study, of the 12 children's upholstered chairs purchased in Washington, 8 contained flame retardants above 1 percent, with an additional chair above 0.5 percent. The results of this study and the Stapleton 2012 study are in Figure 1.

Figure 1. Flame Retardants Detected in Upholstered Furniture Studies



Tents:

A 2014 study evaluated whether flame retardants were applied to the fabric used for camping tents (Keller at al. 2014). The study found that 10 out of 11 tents sampled contained flame retardants at levels ranging from 0.4% to 4%, with 6 out of the 10 greater than 1%. The flame retardants detected were decabromodiphenyl ether (deca-BDE), TDCPP, TBBPA, and TPP. A 2016 study assessed flame retardants in various tent components (the base, rainfly, walls and mesh) of five products (Gomez 2016). Flame retardants were detected in components of 4 out of 5 of the tents with TDCPP being the most common.

Flammability Standards for Camping Tents

Outdoor items, such as camping tents are required to meet flammability standards in seven states (California, Massachusetts, New York, New Jersey, Louisiana, Minnesota, and Michigan) but voluntary

on a national level (Bureau Veritas Bulletin 2008). To comply with these regulations, most manufacturers meet the Industrial Fabric Association International flammability standard for tents CPAI-84 – A Specification for Flame Resistant Materials Used in Camping Tentage[1] that measures flame resistance of fabrics developed by the Industrial Fabrics Association International (IFAI).

While children's play tents and tunnels designed for indoor or outdoor use are not considered camping tents, many children's play tents and tunnels are designed to meet the same flammability requirement. Researchers at Duke University tested 10 children's play tents and tunnels purchased between 2011 and 2012 and found flame retardants (TDCPP and/or TCPP) in 4 of the products at concentrations ranging from 0.1% to 1%.[2]

Changes in Flammability Standards for Upholstered Furniture

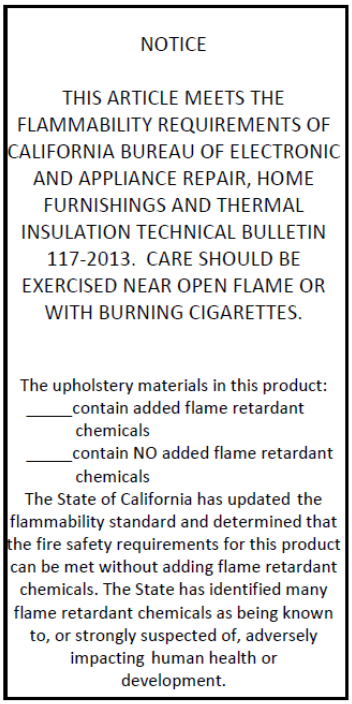
The California standard, Technical Bulletin 117 (TB 117), has been a major driver for flame retardant use in upholstered furniture in the United States. In January 2015, the new standard Technical Bulletin 117-2013[3] (TB 117-2013) replaced TB 117. This standard still requires smolder testing of cover fabric, filling material, decking and barrier (if used) but no longer requires the more stringent open flame test, which the older standard required. The TB 117-2013 standard can be met without the use of flame retardants but it does not ban the use of flame retardants.

In January 2014, California also passed Senate Bill 1019 (SB-1019)[4] which enacted California Business and Professions Code 19094[5] on January 2015. This law requires any flexible polyurethane foam or upholstered furniture sold in California that is required to meet TB 117-2013 to carry a label indicating whether or not the product contains added flame retardant chemicals. Example labels are shown in Figure 2. In California, children's upholstered furniture is required to meet TB 117-2013.

Since TB 117-2103 went into effect and because California is such a large portion of the national market, it is likely the use of additive flame retardants in upholstered furniture has decreased across the United States.

[1] ifai.com/inventory/cpai-84
[2] Heather Stapleton, "Children's tents/tubes," email message, August 21, 2014
[3] bearhfti.ca.gov/about_us/tb117_2013.pdf
[4] leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1019
[5] https://law.justia.com/codes/california/2014/code-bpc/division-8/chapter-3/article-5/section-19094

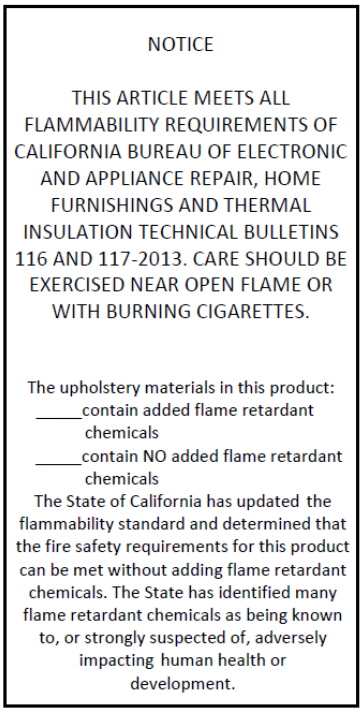
Figure 2. Example TB 117-2013 label with SB 1019 requirements[6]



NOTICE

THIS ARTICLE MEETS THE FLAMMABILITY REQUIREMENTS OF CALIFORNIA BUREAU OF ELECTRONIC AND APPLIANCE REPAIR, HOME FURNISHINGS AND THERMAL INSULATION TECHNICAL BULLETIN 117-2013. CARE SHOULD BE EXERCISED NEAR OPEN FLAME OR WITH BURNING CIGARETTES.

The upholstery materials in this product:
_____contain added flame retardant chemicals
_____contain NO added flame retardant chemicals
The State of California has updated the flammability standard and determined that the fire safety requirements for this product can be met without adding flame retardant chemicals. The State has identified many flame retardant chemicals as being known to, or strongly suspected of, adversely impacting human health or development.



NOTICE

THIS ARTICLE MEETS ALL FLAMMABILITY REQUIREMENTS OF CALIFORNIA BUREAU OF ELECTRONIC AND APPLIANCE REPAIR, HOME FURNISHINGS AND THERMAL INSULATION TECHNICAL BULLETINS 116 AND 117-2013. CARE SHOULD BE EXERCISED NEAR OPEN FLAME OR WITH BURNING CIGARETTES.

The upholstery materials in this product:
_____contain added flame retardant chemicals
_____contain NO added flame retardant chemicals
The State of California has updated the flammability standard and determined that the fire safety requirements for this product can be met without adding flame retardant chemicals. The State has identified many flame retardant chemicals as being known to, or strongly suspected of, adversely impacting human health or development.

Goals and Purpose

The objectives of this project were:

- To evaluate the presence of selected flame retardants in children's tents, play structures, and furniture.
- To evaluate if a laboratory test for phosphorous would be an effective screening method for organophosphate flame retardants.
- To collect sufficient data for compliance staff to determine compliance with Washington's Children's Safe Products Act reporting requirements for selected flame retardants on the CHCC list before the rule update in 2017 (WAC 173-334-130).[7]
- To determine how/if the changes in California regulations have impacted the children's upholstered chairs and sofa products sold in Washington.
- To assess the level of flame retardants in children's play tents and tunnels and if there was a relationship between the use of flame retardants and the CPAI-84 label.

[6] State of California Department of Consumer Affairs, "Senate Bill (SB) 1019," page 5.
[7] apps.leg.wa.gov/WAC/default.aspx?cite=173-334-130

Methods

The design and methods for this study are described in the Quality Assurance Project Plan (QAPP) Addendum (Ecology, 2016).

Product Selection

Products were purchased between February and March 2016 from 18 retailers either in the south Puget Sound region or online. A total of 85 individual products were collected. In general, one product per brand was purchased unless there was a different flammability requirement tag, for example TB 117 versus TB 117-2013 (in stores only). Table 1 shows the number of samples in each category.

Table 1. Number and types of products collected for the 2016 Study

Category	Number of products
Upholstered Chairs and Sofas	38
Tents (play tents, bed tents/covers)	40
Tunnels	6
Bed canopy	1
Total Products	**85**

Sample Processing and Component Selection for Screening and Analysis

Products purchased for this study were logged into the product database at the Ecology headquarters product testing room:

- Product information recorded included the point of purchase, the retail or online store location, and date of purchase.
- Each product was photographed and assigned a unique identification number.
- Product information such as brand, country of manufacture, manufacturer, distributor, or importer was recorded.
- Any labels identifying compliance with a flammability standard were recorded.
- Chain-of-custody was maintained throughout the project.

Product processing involved deconstructing products into components for screening and possible laboratory testing. For XRF screening, all unique components were scanned. For example, tent and tunnel components included unique fabrics (if a tent had a different side or rainfly fabric, both were screened as unique components) and furniture components included unique fabrics and foam.

For the phosphorous analysis (Method 3050B/6020A), at least one fabric component from each tent and tunnel, and a foam and fabric component from each upholstered furniture product, were sent to the laboratory. A total of 55 component samples from upholstered furniture, tents, and tunnels were submitted for both phosphorous and organophosphate flame retardants (OPFRs): TDCPP, TCEP, TCPP, RDP and TPP (Method 3546/8270D) to evaluate a phosphorous analysis as a screening method that could help identify the components that likely contained organophosphate flame retardants.

Additional samples were then selected for laboratory analysis of flame retardants in two stages:

- Stage 1 – tested for analytes listed in Table 2 and included analytes in Table 3 if a sample in the laboratory batch likely contained a brominated flame retardant.
- Stage 2 – tested for analytes listed in Table 4.

Selected components were manually cut into small pieces for laboratory analysis.

Stage 1 samples were selected based on:

- XRF screening results (and phosphorous results for the upholstered furniture).
- Flammability standard label information.
- If the product advertising indicated that flame retardants were added (online only).
- Results from the Ecology 2012-2013 study.

For example, if a product purchased in this study had the same manufacturer as a product in the Ecology 2012-2013 that contained flame retardants, it was sent for analysis.

A subset of the Stage 1 samples were selected for Stage 2 testing. In addition to the criteria from Stage 1, Stage 2 samples were selected based on the Stage 1 results. For example, if the sample contained TCEP, it was sent for analysis as it likely contained V6. If a sample screened positive for bromine but did not contain TBB or TBPH, it was sent and analyzed for TBBPA and HBCD.

X-Ray Fluorescence (XRF) Screening

Each selected tent, tunnel, and furniture component was screened for bromine and antimony using a Niton XL3t XRF analyzer. XRF is a quick, non-destructive method for obtaining the elemental composition of products. All samples were measured either in "TestAll®" or "Plastics non-PVC" mode with a scan time of 60 seconds. Screening components for bromine allowed for the ability to filter those samples without bromine and therefore select samples that possibly containing brominated flame retardants.

The brominated analytes in this study were:

- TBPH
- TBB

- HBCD
- TBBPA

Antimony is frequently used as a synergist in halogenated flame retardant formulations so a positive antimony result can be used as a likely indicator for halogenated flame retardants. The halogenated flame retardants in this study were the brominated flame retardants mentioned above and the chlorinated flame retardants:

- TCEP
- TCPP
- TDCPP
- V6

Laboratory Procedures

Phosphorous Analysis

Ecology's Manchester Environmental Laboratory (MEL) extracted phosphorous in samples following the Environmental Protection Agency's (EPA's) hot block extraction Method 3050B (MEL Standard Operating Procedure (SOP) 720012) and analyzed using inductively coupled plasma mass spectrometry (ICP-MS) following a modified EPA analytical Method 6020A (MEL SOP 720018).

Flame Retardant Analysis

MEL extracted the flame retardant compounds listed in Table 2 in all samples following the EPA's microwave extraction Method 3546 (MEL Standard Operating Procedure (SOP) 730122) and analyzed them using gas chromatography-mass spectrometry (GC/MS) following a modified EPA analytical Method 8270D (MEL SOP 730123). The samples were analyzed using a 15 m Phenomenex Zebron ZB-5MSplus column instead of the 15 m Restek STX-CLPesticide column indicated in the SOP.

The compounds listed in Table 3 were also analyzed in some samples, including all of the samples sent to the lab that screened positive for bromine. RDP (CAS #57583-54-7) was included but results were qualified due to the inability to meet the minimum linearity requirements of the method.

Table 2. Analytes of interest using GC/MS

Type of Analyte	Analyte	CAS Number
Chlorinated phosphate	TCEP	115-96-8
Chlorinated phosphate	TCPP	13674-84-5
Chlorinated phosphate	TDCPP	13674-87-8
Non-halogenated phosphate	TPP	115-86-6

Table 3. Additional analytes of interest using GC/MS

Type of Analyte	Analyte	CAS Number
Non-halogenated phosphate	RDP	57583-54-7
Brominated Flame Retardant	TBB	183658-27-7
Brominated Flame Retardant	TBPH	26040-51-7

Approximately 0.20 g of sample were extracted via microwave-assisted extraction using a 70:30 acetone:hexane solution. After extraction, samples were concentrated, solvent exchanged into isooctane, and diluted. Samples were spiked with surrogates and an internal standard.

A subset of the initial samples were then selected for additional analytes, listed in Table 4, and sent to ALS, a sub-contracted laboratory. ALS extracted these flame retardant compounds using EPA extraction Method 3540C. The extracts were analyzed using liquid chromatography-mass spectrometry/mass spectrometry (LC/MS/MS) following a modified EPA Method 1694 for the analytes in Table 4.

Table 4. Additional analytes of interest using LC/MS/MS

Analytes	CAS Number
V6	38051-10-4
HBCD	3194-55-6 25637-99-4
TBBPA	79-94-7

Approximately 0.20 g of sample were extracted via Soxhlet extraction using a 70:30 acetone:hexane solution. After extraction, the extract was solvent exchanged into acetonitrile. Samples were spiked with surrogate and internal standard solutions.

Standards were purchased as pure neat material with the exception of V6, which was purchased as a technical grade material and purified following the procedure described in Fang et al. 2013.

Data Quality

XRF

XRF performance was assessed at the beginning of a batch of samples with a system test and the results of a plastic reference sample run at the beginning and end of a batch. The plastic reference standard included bromine but did not include antimony.

Laboratory (Phosphorous and Flame Retardant Analysis)

MEL conducted a data quality review of their data packages and the sub-contracted laboratory data packages. Case narratives describing the quality of laboratory data, including instrument calibration, and quality control results, are available upon request.

Quality control tests for each batch analyzed consisted of a method blank, laboratory control samples (LCS), and a laboratory duplicate. For the flame retardant analyses, matrix spikes and matrix spike duplicates were also included. The measurement quality objective (MQO) targets in the QAPP Addendum differed slightly from those reported from the lab. The actual acceptance criteria are shown in Table 5 below.

Table 5. MQOs for laboratory analyses

Analyte	Lab Control Samples (recovery)	Matrix[+] Spikes (recovery)	Duplicates[+] (RPD)[++]	Method Blanks (ppm)[+++]	Surrogate Recovery (recovery)
Phosphorous	85-115%	-	± 40%	< 5	-
TDCPP, TCEP, TCPP, TPP	60-140%	60-140%	± 40%	< 100	50-150%
RDP	50-150%	50-150%	± 40%	< 1000	50-150%
TBPH/TBB	50-150%	50-150%	± 40%	< 100	50-150%
V6, HBCD, TBBPA	60-140%	60-140%	± 40%	< 100	50-150%

[+] Matrix spike duplicates and split duplicates

[++] RPD = Relative Percent Difference

[+++] ppm = parts per million

Phosphorous

Data for the laboratory analyses were generally within the MQO targets outlined in Table 5 and met the calibration and verification checks of the analytical method. All method blanks were below reporting limits. Instances where MQOs were not achieved or standard laboratory procedures were outside of acceptance limits included:

- 1 matrix spike recovery outside of acceptance limits due to insufficient spike levels compared to the native concentration. No action was taken.
- 1 sample with a matrix spike recovery within the RPD acceptance limits but outside the limit for recovery. This was likely due to an inadequate spike level or sample inhomogeneity. The source sample was qualified as an estimate.

Flame Retardant Analysis Using GC/MS

Data for the laboratory analyses were generally within the MQO targets outlined in Table 5. All method blanks were below reporting limits. Instances where MQOs were not achieved or standard laboratory procedures were outside of acceptance limits included:

- Linearity requirements for RDP were not met so results were flagged as estimates.
- 1 surrogate recovery was outside of the MQO limits resulting in qualifying the data as estimates.
- 2 laboratory control samples (LCSs) for TPP were outside of acceptance limits resulting in qualifying the data as estimates.
- 1 calibration check (continuous) for TCPP and TCEP were outside of acceptance limits resulting in qualifying the data as estimates.
- 1 matrix spike/matrix spike duplicate recovery was not calculated due to inadequate spike level. No action was taken.
- Reporting limits were not met for some analytes in several samples due to high concentrations for other target analytes within that sample. No action was taken.

Flame Retardant Analysis Using LC/MS/MS

Sample data were within the MQO targets outlined in Table 5 with the exception listed below. All method blanks were below reporting limits.

- 2 laboratory control samples (LCSs) for TBBPA were outside of acceptance limits resulting in qualifying the data as estimates.

Results and Discussion

XRF Screening

From 85 products, 290 components were screened for bromine and antimony using an XRF analyzer.

Scanning 290 components using XRF resulted in:

- 188 components bromine levels below the level of detection (<LOD).
- 82 components with bromine levels detected but less than 1,000 ppm.
- 5 components with bromine levels between 1,000 and 5,000 ppm.
- 15 components (from 10 products: 3 upholstered furniture and 7 tents/tunnels) with bromine levels above 5,000 ppm (0.5%).
- 4 components (from 3 products: 1 upholstered furniture and 2 tents/tunnels) had antimony values above 1,000 ppm.
    - Note: All 4 of these components also had bromine levels above 5,000 ppm.

At least 1 component from each product containing XRF screening results above 1,000 ppm were sent for flame retardant analyses.

Laboratory Phosphorous Results

Assessing the Phosphorous Method as a Screening Method

Phosphorus and laboratory results for selected organophosphate flame retardants (OPFRs), TDCPP, TCEP, TCPP, RDP and TPP, were compared using 55 component samples to assess the ability to use the proposed phosphorous method (3050B/6020A) as a screening method for OPFRs.

Results were considered positive when the phosphorous results were greater than 1,000 ppm and the sum of the detected OPFRs were greater than 1%, negative when phosphorous results were less than 1,000 ppm and the sum of the OPFRs were non-detect. A sample was considered a false positive when phosphorous was greater than 1,000 ppm but the sum of the OPFRs were less than 1,000 ppm and a false negative when the sum of the detected OPFRs was greater than 1% and phosphorous was less than 1,000 ppm.

Table 6. Phosphorous and Organophosphate Flame Retardant Comparison

Matrix	Positive	Negative	False Negative	False Positives	# Samples
Upholstered Furniture Foam	5	14	0	0	**19**
Upholstered Furniture Fabric	1	6	0	0	**7**
Tent and Tunnel Fabric	2	7	7	13	**29**

As shown in Table 6, screening for phosphorous correctly identified all samples containing OPFRs in the upholstered furniture. For tent and tunnel fabrics, the screening method resulted in a number of false negatives indicating that the method conditions used in this study did not work well for tent fabrics. It is possible that the tent samples were not completely digested. The false positive results are likely due to inorganic phosphorous, organophosphate compounds not analyzed in this study, or interference in the method.

As a result of these comparisons the phosphorous method was used as a screening tool for the remaining furniture that had not been sent for OPFR analysis but not for the tent and tunnel fabric due to the false negatives.

Phosphorous Screening for Furniture

For each furniture product, one fabric sample and at least one foam sample was sent for phosphorous screening.

- A total of 71 furniture components from all 38 upholstered chair and sofa products were tested for phosphorous:
    - 8 component samples from 7 products reported phosphorous above 1,000 ppm.

- A total of 106 tent components from all 47 tent and tunnel products were tested for phosphorous:
    - 21 component samples from 14 products reported phosphorous above 1,000 ppm.

At least one component from each product that contained phosphorous results above 1,000 ppm was sent for GC/MS flame retardant analyses. Discussion of the laboratory flame retardant sample results are provided in the following sections.

Flame Retardant Results

Overview of the Results

As previously mentioned, 290 components from 85 products were screened with XRF. If an XRF result for a component was negative for bromine, then this indicated that component did not contain a brominated flame retardant (such as TBPH, TBB, HBCD, TBBPA). For upholstered furniture, if a phosphorous result was negative for phosphorous, that indicated the component did not contain an organophosphate flame retardant (such as TPP, TDCPP, TCPP, TCEP, V6). This reduced the number of components that were sent to the lab.

Of the 84 samples from 71 products sent to a laboratory for a flame retardant analysis, 21 samples from 17 products contained flame retardants above the method reporting limit. Individual concentrations ranged from the reporting limits to 84,600 ppm (8.46%). A summary of the total flame retardant concentrations and matrix are listed in Table 7. From 15 products, 17 samples had flame retardants at the percent level which indicated intentional use. Levels near the reporting limit could be cross contamination during manufacturing, flame retardant impurities, or flame retardants from recycled content. Concentrations slightly lower than percent level could also be part of a mixture.

Table 7. Summary of matrix and analyte concentration measured in components

Matrix	Sum of analytes < 10,000 ppm	Sum of analytes > 10,000 ppm (> 1%)	Total samples above RL
Chair Foam	0	5	**5**
Chair Fabric	0	1	**1**
Tent Fabric	2	11	**13**
Tent Mesh	2	0	**2**

Most of the upholstered furniture samples with analytes in the percent level (> 10,000 ppm) were foam samples, which is the matrix where flame retardants are usually found in furniture but one of the samples was fabric.

A summary of the components sent to the laboratory for flame retardant analyses is in Appendix 1. Complete laboratory results for this study can be downloaded from Ecology's product testing database.[8]

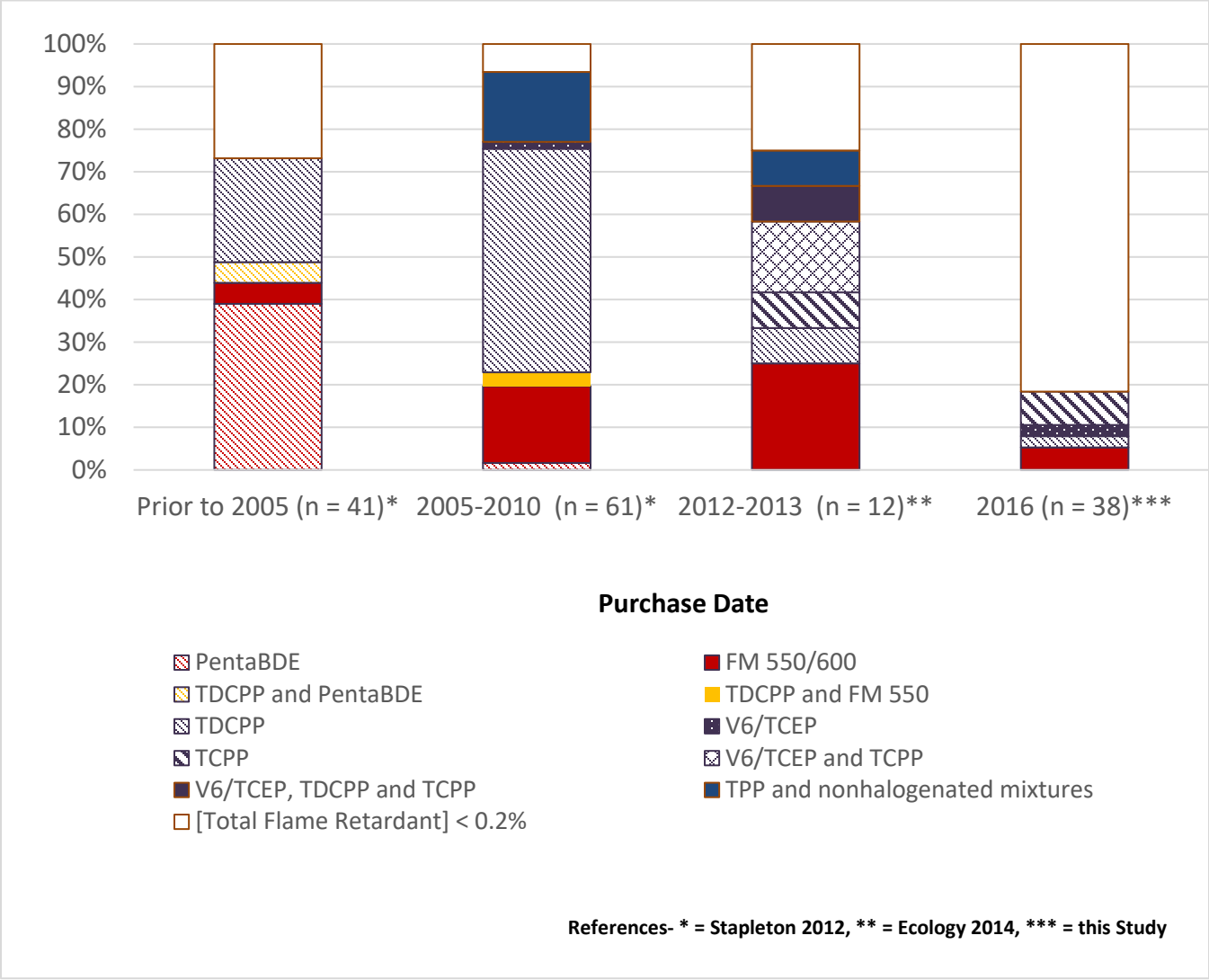
Flame Retardant Labels, Manufacturing Dates, and Flame Retardant Results

A table of the information found on the flame retardant standard tags attached to upholstered furniture collected for this study is listed in Table 8. Sixteen of the upholstered products did not list manufacturing dates. Of the 22 products with manufacturing dates, 8 had manufacturing dates of 2014 or earlier, and 14 were manufactured after the start of 2015. These dates are important because the TB 117-2013 standard went into effect in 2014 and became mandatory January 2015. This standard no longer requires an open flame test in addition to a smolder test, which was a driver for flame retardant use in furniture. The use of flame retardants in upholstered furniture was likely to decrease due to this new standard.

In this study, 7 out of 38 upholstered furniture products contained flame retardants compared to 9 out of 12 in the 2012-2013 study. This comparison is just a snapshot but the general trend appears to be decreasing. Figure 3 shows a comparison between the flame retardants found in upholstered furniture in this study and those of previous studies.

[8] https://apps.ecology.wa.gov/ptdbreporting/

Figure 3. Flame Retardants Detected in Upholstered Furniture Studies



One of the chairs that contained flame retardants was manufactured in March 2012, almost 4 years before the start of this study. This product was labeled with a TB 117-2013 and SB 1019 that said, "The upholstery material in this product contain NO added flame retardant chemical," indicating no use of flame retardants. Considering this product was manufactured prior to the passage of TB 117-2013 and that the label appeared to be stitched on, it is likely the manufacturer added the label to this older product in error.

Another chair, purchased from the same manufacturer, was manufactured in November of 2015. It was labeled with a TB 117-2013 and SB 1019 label that said, "The upholstery material in this product contain NO added flame retardant chemical." When this product was tested, it contained none of the flame retardants in this study.

None of the products labeled as manufactured after January 2015 (10 products) contained any of the flame retardants assessed in this study. They also did not screen positive for phosphorous or bromine.

While none of the products contained any of the flame retardants evaluated in this study, manufacturers are indicating the absence of added flame retardants by using the label SB 1019, "The upholstery material in this product contain NO added flame retardant chemical." This discloses information to consumers that gives them the ability to make more informed decisions.

In California, manufacturers are allowed to sell their old TB 117 inventory indefinitely.

Table 8. Upholstered furniture manufacturing dates, flammability standard labels, and number of products with detected flame retardants

Manufacturing Date	TB 117-2013: Does not contain additives	TB 117-2013: Does contain additives	TB 117-2013: No SB label	TB117 and/or TB116****	No label or partial label	Total # of products with flame retardants
Before January 2015	*1/1**	-	0/1	2/6	-	**3/8**
Unknown Date	0/7	0/1	1/3**	1/1***	2/4	**4/16**
After January 2015	0/10	0/2	-	0/2	-	**0/14**

*It is believed that this product was incorrectly relabeled after manufacture.

** These products are likely pre-January 2015 as the SB requirement took effect in January 2015.

*** This product is likely pre-January 2015 as the TB-117-2013 took effect in January 2015.

**** TB116 is another flammability standard

Of the 47 play tents, tunnels, and canopy, 29 had CPAI-84 labels. One tent included a label showing it was made with flame resistant fabric that meets ASTM-F963-96a specifications. Another tent included a label showing it met the ASTM-F963 safety standards.

Of the 10 tents that were found to contain flame retardants above the method reporting limit, 9 had the CPAI-84 label and 1 did not. None of the tunnels were found to contain flame retardants from this study but all had the CPAI-84 label. One screened positive for bromine and another contained phosphorous. These results indicate that the CPAI-84 label alone does not identify products with or without flame retardants.

A breakdown of the individual flame retardant analyses is listed below.

Chlorinated Organophosphates by GC/MS (TDCPP, TCEP, TCPP)

From 70 products, 83 samples were sent to MEL laboratory for analysis of the flame retardants identified in Table 2.

At least one of TDCPP, TCEP and/or TCPP were detected in 19 samples from 15 products (10 children's tents and 5 children's chairs). From 13 products, 15 samples contained individual flame retardants above

1,000 ppm (9 children's tents and 5 children's chairs). Table 9 and 10 list the samples where at least one chlorinated phosphate flame retardant level measured above the reporting limit.

Table 9. Chlorinated phosphate flame retardant levels measured in upholstered furniture foam and fabric

Sample	TDCPP (ppm)	TCEP (ppm)	TCPP (ppm)	Matrix	Manufacturer Date	Flammability Standard label
AM-7-3-2	**16,500**	< 478	< 478	Foam	None	TB-117
BB-5-2-1	1350	< 93.7	**25,100**	Foam	3/12	TB-117-2013 no additives*
BL-8-1-1	< 465	< 465	**33,700**	Foam	6/14	TB-117
TR-22-2-1	< 491	< 491	**84,600**	Foam	10/13	TB-116/TB-117
TR-22-3-2	< 482	**13,000**	< 482	Fabric	None	TB-117-2013 no SB label

*it is believed that this product was incorrectly relabeled after manufacture

Unlike previous studies (Stapleton 2011, 2012), TDCPP was not the most common chlorinated phosphate detected in furniture foam and was only found in two foam samples with only one in the percent level. Three foam samples from three products contained TCPP, all in the percent level. One upholstered chair contained TCEP in the percent level in the fabric. Unlike previous studies, TCEP was found in the fabric rather than the foam.

TCEP can be an impurity from another flame retardant known as V6, also found in foam, so that sample was evaluated for V6. The results are discussed in a later section.

Table 10. Chlorinated phosphate flame retardant levels measured in tents and tunnels fabric

Sample	TDCPP (ppm)	TCEP (ppm)	TCPP (ppm)	Matrix	Flammability Standard label
WM-27-3-1	**34,600**	< 92.1	< 92.1	Fabric	CPAI-84
AM-9-2-2	**31,000**	< 99.0	< 99.0	Fabric	CPAI-84
TR-21-2-1	**25,100 (12,900 duplicate)**	< 491 (110 duplicate)	< 491 (< 98.9 duplicate)	Fabric	-
TG-30-2-2	**23,800**	< 98.4	< 98.4	Fabric	CPAI-84
TG-29-7-4	**19,200**	< 98.9	< 98.9	Fabric	CPAI-84
AM-10-2-3	**16,700**	< 96.5	< 96.5	Fabric	CPAI-84
TG-29-2-2	**13,800**	< 91.0	< 91.0	Fabric	CPAI-84
TG-30-2-1	**13,500**	< 95.6	< 95.6	Fabric	CPAI-84
TG-29-7-3	**13,000**	< 92.6	< 92.6	Fabric	CPAI-84

Sample	TDCPP (ppm)	TCEP (ppm)	TCPP (ppm)	Matrix	Flammability Standard label
TG-29-10-2	**10,700**	< 98.7	< 98.7	Fabric	CPAI-84
TG-30-2-4	1,280	< 95.7	< 95.7	Mesh	CPAI-84
WM-25-1-1	1,150	< 97.3	218	Fabric	CPAI-84
TG-29-7-2	814	< 100	< 100	Mesh	CPAI-84
WM-27-2-2	103	< 71.6	< 71.6	Fabric	CPAI-84

TDCPP was the most common flame retardant found in the play tent fabric. The concentrations are mainly 1-4% by weight which are similar to the levels found in previously reported camping tent studies (Keller 2014, Gomes 2016).

While TDCPP and TCEP were allowed in these products at the time of this study, a new section of the Children's Safe Products Act was added and took effect after this study was initiated that restricts the use of TDCPP, TCEP, TBBPA, HBCD, and deca-BDE. After July 1, 2017, children's products and residential upholstered furniture sold in Washington cannot contain more than 1,000 parts per million of these flame retardant chemicals.

Non-halogenated Phosphates and Brominated Analytes in Firemaster ® Mixtures

From 48 products, 55 samples were analyzed. The two components that screened for bromine above 5,000 ppm using XRF were found to contain the two brominated compounds, 2-ethylhexyl-2,3,4,5-tetrabromobenzoate (TBB) and bis(2-ethylhexyl)-2,3,4,5-tetrabromophthalate (TBPH), and the organophosphate triphenylphosphate (TPP) which are some of the analytes in the Firemaster ® mixtures. In addition to the halogenated flame retardant mixtures, TPP is found in non-halogenated flame retardant mixtures (Stapleton 2009, 2012). None of the components analyzed were found to contain TPP without a halogenated analyte. RDP was not detected in any samples.

Table 11. TPP, TBPH, and TBB levels measured in products

Sample	Analyte: TBB (ppm)	Analyte: TBPH (ppm)	Analyte: TPP (ppm)	Matrix	Manufacturer Date	Flammability Standard label
AM-8-2-4	**77,800**	**16900**	**21,600** J	Foam	-	-
WF-2-1-3	**24,300** J	7,860 J	9,010 J	Foam	11/2014	TB-116 and TB-117

HBCD, V6, TBBPA

A subsample of 29 samples from 27 products were sent to a second laboratory (ALS) to be analyzed for 3 additional analytes listed in Table 4.

V6 was detected in two samples from two products. One sample contained trace levels while the other sample contained more than 1,000 ppm but less than 1%. TCEP is an impurity in V6 and has been reported as 4.5-7.5 % of the V6 concentration (EU, 2007). Based on the TCEP results mentioned in the previous section and other studies of V6 in children's products, one would expect a higher result for V6. A study that measured V6 in 12 children's products found V6 ranging from 2.5 to 6% (Fang 2013) with TCEP ranging from 0.1 to 0.6 percent.

TBBPA and HBCD were not detected in any samples.

Table 12. V6 levels measured in products

Sample	Analyte	Conc. (ppm)	Matrix	Component Description	Flammability Standard label
TR-22-3-2	V6	7300	Fabric	Chair cover	TB-117-2013, No SB 1019 label
WM-25-1-1	V6	120	Fabric	Teepee Tent	CPAI-84

Additional Information

Of the 15 samples, the 10 that detected phosphorous did not identify the organophosphate flame retardants assessed in this study. An additional sample that screened for phosphorous contained only a low level of organophosphate flame retardants. These false positive results are likely due to inorganic phosphorous, organophosphate compounds not analyzed in this study, or interference in the method.

Of the 6 tents and tunnels that screened positive for bromine above 0.5% using the XRF, they did not contain the brominated flame retardants analyzed in this study. These results are likely due to other brominated compounds which are likely flame retardants. A previous camping tent study detected deca-BDE in tents in use in 2013 (Keller 2014). Based on these results, ion chromatographs of three of the samples were evaluated for the m/z for the specific quant and qual molecular ions associated with several PBDE. None of these were found. While this cannot confirm that deca-BDE was not in the samples, it likely confirms that it was not in the products at a high level.

Summary

Results from this study support the following conclusions:

- 17 out of 85 products contained flame retardants above the method reporting limits. Fifteen of those were at the percent level. The flame retardants detected in at least one sample were TDCPP, TCEP, TCPP, components of Firemaster 550/600 and V6. No products were found to contain RDP, HBCD and TBBPA.

- The phosphorous method used in this study was an effective screening method for upholstered furniture but not for the tents and tunnels.

- The majority of the children's products purchased did not contain flame retardants above the method reporting limits and were compliant with Washington regulations.

- Manufacturers of children's upholstered furniture appear to have largely moved away from using flame retardants. Organophosphate flame retardants and the analytes in the mixtures Firemaster® 550/600 were found in percent levels in only 7 of the 38 upholstered furniture products.

- None of the 17 products that carried the label TB 117-2013 or SB 1019 ("The upholstery material in this product contain NO added flame retardant chemical") and were either reported to have been manufactured after January 2015 or no manufacturing date was reported, contained flame retardants above the reporting limits.

- TDCPP was the most common flame retardant found in children's tents and was found in 9 of the tents in percent levels. Of these products, 8 had the CPAI-84 label but 1 did not have a label indicating that the flammability label alone could not ensure a product without flame retardants.

- The 6 tents and tunnels that screened positive for bromine using the XRF did not contain the brominated flame retardants investigated in this study. The screening results are likely due to other brominated compounds that could be other brominated flame retardants.

Recommendations

Based on findings of this study, the following recommendations are made:

- Screening techniques help one use resources efficiently by reducing the number of samples requiring confirmatory analysis of individual analytes. If funding allows, future sampling efforts for flame retardants should rent or purchase an XRF or HD-XRF that has the ability to screen for chlorine and phosphorous.
    - If phosphorous cannot be assessed by XRF, further work to validate a laboratory-phosphorous method as a screening tool should be performed.
- Additional assessments of upholstered furniture should be performed to ensure CSPA flame retardant (restriction and reporting) compliance. Future assessments should focus on furniture with the following labels:
    - TB 117-2013, SB 1019 ("The upholstery material in this product contain added flame retardant chemical") or
    - TB 117-2013, one without the SB label
    - TB 117 or TB 116
    - Products without labels
- Due to the number of play tents found to contain flame retardants, additional analysis of children's products with flammability standard labels, including the CPAI-84 label,

should be assessed to ensure that these products comply with the CSPA reporting requirements and regulatory limits. Other products that could be assessed are children's sleeping bags, and children's camping chairs.

- Additional alternative brominated flame retardants and organophosphate flame retardants should be assessed in fabric. A number of fabric samples were found from screening analyses to contain bromine or phosphorous but the limited number of brominated and organophosphate flame retardants tested for were not found.
- Washington should consider adding a flame retardant chemical statement to products such as upholstered furniture (only required in California) and children's tents and tunnels. This could help consumers identify products without flame retardants.
- Since play tents and tunnels are not intended for outdoor camping, manufacturers should assess if the flammability standard CPAI-84 – A Specification for Flame Resistant Materials Used in Camping Tentage is a requirement for their products.
- Due to a lack of detects of flame retardants in children's upholstered furniture with the TB 117-2013, SB 1019 ("The upholstery material in this product contain NO added flame retardant chemical"), consumer outreach on the labeling as a way to identify products without flame retardants should be considered.

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Acronyms and Abbreviations

Acronyms

CHCC	Chemical of high concern to children
CSPA	Washington's Children's Safe Product Act
Deca-BDE	Decabrominated diphenyl ether
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
HBCD	Hexabromocyclododecane
LCS	Laboratory control sample
MEL	Manchester Environmental Laboratory
MQO	Measurement quality objective
RDP	Resorcinol diphenyl phosphate
RPD	Relative Percent Difference
Penta-BDE	Penta-brominated diphenyl ether
PBDEs	Polybrominated diphenyl ethers
SB 1019	(California) Senate Bill 1019
SOP	Standard Operating Procedure
TB 117	(California) Technical Bulletin 117
TB 117-2013	(California) Technical Bulletin 117-2013
TBB	2-ethylhexyl 2,3,4,5-tetrabromobenzoate
TBBPA	Tetrabromobisphenol-A
TBPH	(2-ethylhexyl) tetrabromophthalate
TCEP	Tris(2-chloroethyl) phosphate
TCPP	Tris(1-chloro-2-propyl) phosphate
TDCPP	Tris(1,3-dichloro-2-propyl) phosphate
TPP	Triphenyl phosphate
V6	2,2-bis(chloromethyl)-propane-1,3-diyltetrakis(2-chloroethyl) bis(phosphate)
XRF	X-ray fluorescence

Data Flags

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was analyzed for and was not present above the level of the associated value. The associated numerical value may not accurately or precisely represent the concentration necessary to detect the analyte in this sample.
U	The analyte was not detected at or above the reported sample quantitation limit.

Units of Measurement

ppm	part per million

Appendix 1

Product label information, screening, and lab results for samples sent to the lab for flame retardant analysis

Table 13. Play tents and tunnels

Sample ID[9]	Material	Product Description	Flame retardant detected[10]	XRF Br > 1%	P > 0.1%	Flammability Standard Label	Manufacturer date
AM-10-1-1	Fabric	Play Tent	-	-	+	CPAI-84 label	-
AM-10-2-3	Fabric	Play Tent	**TDCPP**	-	-	CPAI-84 label	-
AM-10-3-2	Fabric	Play Tent	-	-	-	CPAI-84 label	-
AM-7-1-1	Fabric	Play Tunnel	-	-	-	CPAI-84 label	-
AM-7-2-1	Fabric	Play Tent	-	-	-	CPAI-84 label	-
AM-7-4-1	Fabric	Play Tent	-	-	-	CPAI-84 label	-
AM-9-1-1	Fabric	Play Tunnel	-	-	-	-	-
AM-9-2-2	Fabric	Bed Tent	**TDCPP**	-	+	CPAI-84 label	-
AM-9-3-1	Fabric	Play Tunnel	-	-	-	-	-
BB-5-1-1	Fabric	Bed Tent	-	-	-	-	-
HL-3-1-1	Fabric	Teepee	-	-	+	CPAI-84 label	-
IK-1-1-3	Fabric	Play Tent	-	-	+	CPAI-84 label	-
KL-3-1-1	Fabric	Teepee	-	-	+	Conforms to ASTM F963 Safety Standards	-
KM-1-2-2	Fabric	Play Tent	-	-	-	-	-
KM-1-3-1	Fabric	Play Tent	-	-	-	CPAI-84 label	9/2015
TG-26-2-3	Fabric	Play Tent	-	-	-	-	2015
TG-27-1-2	Fabric	Play Tent	-	-	-	CPAI-84 label	-
TG-27-2-1	Fabric	Bed Canopy	-	-	-	-	-
TG-29-10-2	Fabric	Camping Tent	**TDCPP**	-	-	CPAI-84 label	-
TG-29-1-1[11]	Fabric	Play Tunnel	-	+	-	CPAI-84 label	-
TG-29-1-2	Fabric	Play Tunnel	-	-	+	CPAI-84 label	-
TG-29-2-2	Fabric	Play Tent	**TDCPP**	-	-	CPAI-84 label	-
TG-29-3-1	Fabric	Play Tent	-	-	+	CPAI-84 label	-
TG-29-4-1	Fabric	Teepee	-	-	-	CPAI-84 label	-
TG-29-5-1	Fabric	Bed Tent	-	-	-	CPAI-84 label	-

[9] Bold Green= GC/MS analysis and TBBPA, HBCD and V6
[10] In order of relative abundance; Bold= >1%, not bold < 1%
[11] Only analyzed for TBBPA, HBCD and V6

Sample ID[9]	Material	Product Description	Flame retardant detected[10]	XRF Br > 1%	P > 0.1%	Flammability Standard Label	Manufacturer date
TG-29-6-3	Fabric	Teepee	-	-	-	-	-
TG-29-7-2	Mesh	Camping Tent	TDCPP	-	+	CPAI-84 label	-
TG-29-7-3	Fabric	Camping Tent	**TDCPP**	> 0.5%	-	CPAI-84 label	-
TG-29-7-4	Fabric	Camping Tent	**TDCPP**	-	-	CPAI-84 label	-
TG-29-8-1	Fabric	Play Tent	-	-	+	CPAI-84 label	-
TG-29-8-3	Fabric	Play Tent	-	-	-	CPAI-84 label	-
TG-29-9-1	Fabric	Play Tent	-	-	-	-	-
TG-30-1-3	Fabric	Play Tent	-	-	-	-	-
TG-30-2-1	Fabric	Camping Tent	**TDCPP**	> 0.5%	-	CPAI-84 label	9/2015
TG-30-2-2	Fabric	Camping Tent	**TDCPP**	-	-	CPAI-84 label	9/2015
TG-30-2-4	Mesh	Camping Tent	TDCPP	-	-	CPAI-84 label	9/2015
TM-2-1-1	Fabric	Play Tent	-	-	-	-	2015
TR-19-6-1	Fabric	Play Tent	-	-	-	CPAI-84 label	-
TR-21-1-2	Fabric	Teepee	-	-	+	CPAI-84 label	-
TR-21-2-1	Fabric	Teepee	**TDCPP**	> 0.5%	-	-	-
TR-21-3-1	Fabric	Play Tent	-	> 0.5%	-	meets ASTM-F963-96a specifications	-
TR-21-4-1	Fabric	Play Tent	-	-	-	CPAI-84 label	-
WM-25-1-1	Fabric	Teepee	TDCPP, TCPP, V6	+	+	CPAI-84 label	-
WM-27-1-1	Fabric	Bed Tent	-	-	-	CPAI-84 label	-
WM-27-2-1	Fabric	Play Tent	-	-	+	CPAI-84 label	-
WM-27-2-2	Fabric	Play Tent	TDCPP	-	+	CPAI-84 label	-
WM-27-3-1	Fabric	Bed Tent	**TDCPP**	> 0.5%	-	CPAI-84 label	-
WM-27-4-1	Fabric	Play Tent	-	-	-	-	-
WM-27-5-2	Fabric	Play Tent	-	-	-	-	-
WM-27-6-1	Fabric	Play Tent	-	-	-	-	-
WM-27-7-2	Fabric	Play Tunnel	-	-	-	CPAI-84 label	-
WM-27-7-3	Mesh	Play Tunnel	-	-	+	CPAI-84 label	-
WM-28-1-1	Fabric	Bed Tent	-	-	-	-	-
WM-28-1-2	Fabric	Bed Tent	-	-	-	-	-
WM-28-2-1	Fabric	Play Tunnel	-	-	-	CPAI-84 label	-
WM-28-3-2	Fabric	Teepee	-	-	-	-	-

Table 14. Upholstered furniture

Sample ID[12]	Material	Product Description	Flame retardant detected[13]	XRF Br > 1%	P > 0.1%	Flammability Standard Label	Manufacturer date
AM-11-1-1	Foam	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	11/2015
AM-11-1-2	Fabric	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	11/2015
AM-7-3-2	Foam	Child's Chair	**TCPP**	-	+	TB-117 label	-
AM-8-2-4	Foam	Child's Chair	**TBB, TPP, TBPH**	+	+	-	-
BB-5-2-1	Foam	Child's Chair	**TCPP,** TDCPP	-	+	TB-117-2013 label. SB 1019- does not contain additives	3/2012
BL-8-1-1	Foam	Child's Chair	**TCPP**	-	+	TB-117 label	6/2014
KM-2-1-1	Foam	Child's Chair	-	-	-	TB-117-2013 label. No SB 1019 label	11/2014
LN-1-1-2	Foam	Child's Chair	-	-	-	TB-116 and TB-117 label	12/2014
MH-2-1-2	Fabric	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	4/2015
PK-1-1-2	Fabric	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	11/2015
SK-10-1-1	Foam	Child's Chair	-	-	-	TB-117 label	1/2015
TG-26-1-1	Fabric	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- contains additives	2015
TG-26-1-2	Foam	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- contains additives	2015
TG-28-1-2	Fabric	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- contains additives	2016
TG-28-1-5	Foam	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- contains additives	2016

[12] Bold Green= GC/MS analysis and TBBPA, HBCD and V6
[13] In order of relative abundance; Bold= >1%, not bold < 1%

Sample ID[12]	Material	Product Description	Flame retardant detected[13]	XRF Br > 1%	P > 0.1%	Flammability Standard Label	Manufacturer date
TG-28-2-2	Fabric	Gaming Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	-
TG-28-3-1	Foam	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- contains additives	-
TR-19-1-1	Foam	Child's Sofa	-	-	-	TB-117-2013 label. No SB 1019 label	-
TR-19-3-2	Foam	Child's Chair	-	-	-	TB-117 label	9/2015
TR-19-4-1	Fabric	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	11/2015
TR-19-4-2	Foam	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	11/2015
TR-19-7-1	Foam	Child's Chair	-	-	-	-	Date of Delivery 7/2015
TR-22-2-1	Foam	Child's Chair	**TDCPP**	-	+	TB-116 and TB-117 label	10/2013
TR-22-3-1	Foam	Child's Chair	-	-	-	TB-117-2013 label. No SB 1019 label	-
TR-22-3-2	Fabric	Child's Chair	**TCEP**, V6	+	+	TB-117-2013 label. No SB 1019 label	-
WF-2-1-3	Foam	Child's Chair	**TBB, TPP, TBPH**	> 0.5%	+	Incomplete label	-
WF-2-3-1	Foam	Child's Chair	-	-	-	TB-116 and TB-117 label	11/2014
WM-26-1-6	Foam	Child's Chair	-	-	-	TB-117-2013 label. SB 1019- does not contain additives	2/2016