CSM
Chemical Sensitivities Manitoba

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Re: Response to consultation document – Certain Organic Flame Retardant Substances

Chemical Sensitivities Manitoba (CSM) and Prevent Cancer Now (PCN) are submitting the following comments in response to the consultation document titled, "Certain Organic Flame Retardant Substances", released October 8, 2016, in the *Canada Gazette,* Part 1.[1]

OVERVIEW

Flame retardants are synthetic chemicals that are intentionally added to many fabrics, foams and plastics in commercial and consumer products including electronics, electrical equipment, vehicles, furniture, camping gear and construction materials, with the intent of improving safety by reducing flammability. In effect, flame retardants are now ubiquitous in our environment, and as a result, our exposures are chronic and difficult to circumvent – at work and at home. Human exposures can differ considerably as factors such as geographic location, socio-economic standing, and ethnicity are all factors influencing the intensity of exposures.

Polychlorinated biphenyls (PCBs), the first set of flame retardants, are considered persistent organic pollutants under the Stockholm Convention. Prohibition of the import, manufacture, and sale (for re-use) and release to the environment of PCBs in Canada, was followed by the introduction of another set of "safer" flame retardants – polybrominated diphenyl ethers (PBDEs), now designated "CEPA toxic."

With the proposed listing of decaBDE to Annex A of the Stockholm Convention at the upcoming Convention of Parties 8 (COP8) in April 2017, with specific exemptions[2], the process of substitution has been initiated. As of December 23, 2016, the manufacture, use, sale, offer for sale and import of decaBDE and products that contain decaBDE will

[1] *Canada Gazette,* Part 1. Certain organic flame retardant substances. October 8, 2016. http://gazette.gc.ca/rp-pr/p1/2016/2016-10-08/html/notice-avis-eng.php#na1
[2] Environment and Climate Change Canada. November 10, 2016. Webinar: Stockholm Convention: Eighth Conference of the Parties (COP8) -Listing of decabromodiphenyl ether (commercial mixture, c-decaBDE).

be prohibited in Canada, with the important exemption for manufactured items.[3] At present, there are no considerations for recycling and disposal.

The subject of the current consultation, organic flame retardants (OFRs) listed in Table 1, are already in use but are not manufactured in Canada. They include a range of chemicals, from ones that were assessed as being of no concern to human health or the environment, to others that are CEPA-toxic (they are hazardous *plus* pose risks due to high levels). In between are substances with hazardous properties, but would be considered of concern to human health and the environment if use levels were to increase.

With these risk-based determinations, an important issue is: how does the government determine "safe" or "threshold" exposure levels for carcinogens and endocrine disruptors, with non-linear and uncertain dose responses, additive or synergistic effects of multiple exposures, and in light of experts' statements that there are no "safe" levels?

In risk assessments, all significant biological effects should be considered adverse by default. It is not uncommon to have considerable latitude in judgement of "adversity," with transitory and non-lethal effects deemed acceptable, and death considered adverse. A high bar should be used to justify any conclusion other than "adverse," given complexities and synergisms across all ages and stages, in conjunction with other ubiquitous toxicants, and across increasingly stressed ecosystems.

Polybrominated flame retardants (PBFRs), the most common form of flame retardants, are designed to be persistent. Thus, it is not surprising to find them in many components of the environment, including indoor dust; they have also been detected in tissues of humans and wildlife.[4, 5] Scientific evidence indicates that the higher brominated PBDEs (e.g. decaBDE) are capable of undergoing chemical degradation resulting in the formation of even more persistent and toxic lower brominated congeners including PBDEs, brominated bisphenols, and polybrominated dibenzo-p-dioxins (PBDDs)/polybrominated dibenzofurans (PBDFs).[6] Incongruously, while the lower PBDEs were eliminated from commerce, the higher brominated PBDEs, like decaBDE, stayed in commerce. The high potential for analogous behavior of other PBFRs, such as DBDPE, should warrant precautionary proscription pending possible in-depth assessment. The goal should be to a move towards elimination; not continued usage at lower levels, or use as a probably-unsuitable substitute.

Similarities in chemical structure between PBDEs and a thyroid hormone, raise well-founded concerns about the impacts of these substances on the endocrine system. The impacts of endocrine disruptors (EDs) on human health and the environment have again triggered significant criticism in the European Union. Aligning EDs with other

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[3] Ibid.

[4] Indigenous and Northern Affairs Canada. A Persistent Organic Pollutants (POPs) Fact Sheet Series: Polybrominated Diphenyl Ethers (PBDEs). Accessed December 2016. https://www.aadnc-aandc.gc.ca/eng/1316111586958/1316111636945

[5] U.S. government - National Institutes of Health. Flame Retardants. Accessed November 2016. http://www.niehs.nih.gov/health/materials/flame_retardants_508.pdf

[6] Birnbaum LS, Staskal DF. Brominated flame retardants: cause for concern? Environ Health Perspectives 112:9-17 (2004).

substances that have an impact on human health and the environment is at the centre of a public health fiasco as financial interests appear to trump evidence-based science.[7]

Even with scientific evidence of potential harm of EDs at environmentally relevant concentrations highlighting the impacts on human health,[8] and particularly during the critical windows of development,[9] Canada still appears to resist placing emphasis on EDs in its risk assessments. For example, bisphenol A (BPA), an ED that is ubiquitous in food can linings, drink containers, myriad hard plastic products and thermo-paper, was detected in the blood of almost every Canadian tested (Canadian Health Measures Survey). The Canadian ban of BPA from products for babies, because the chemical mimics estrogen in the body, led to an unfortunate substitution from the same chemical family. The substitutes are comparable in terms of endocrine disruption. While babies were intended to be protected, the workers in plastics and manufacturing, including women of reproductive age, were not addressed. This unfortunate pattern should not be repeated with flame retardants.

Tests for flammability standards are performance-based; there has been considerable controversy as to how applicable the open flame test method, used for some commonly used consumer products, is to real-life fire incidents. The smouldering flame tests appear to be a better choice for some products; however, methodologies for flame propagation that are more applicable to real-life circumstances must be further researched.

In the search for alternatives to halogenated organic flame retardants, the heavy reliance on chemical additions to provide the safety net for flame retardancy should be eliminated. Clearly, other options merit consideration, including redesign of products, and the inclusion of materials that are inherently flame resistant in some consumer products – this could eliminate fire retardants in upholstered products. Current strict adherence to possibly flawed flammability standards, and the phase out of some PBFRs, could result in increased usage of some flame retardants, many of which have not been assessed but exhibit credible potential for serious toxic properties.

Our submission identifies that chemical structural similarities between flame retardants and alternatives suggest that endocrine disruption may be a common problem and poses potential for "unfortunate substitution." We also discuss toxicities specific to organophosphates, and highlight implications of flammability test methods for some consumer products.

Recommendations are summarized below, following discussion.

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[7] Above the Fold Newsletter – Environmental Health News with links to scientific reports. December 1, 2016. 3 part series.
http://www.environmentalhealthnews.org/ehs/news/2016/dec/endocrine-disruptors-the-manufacture-of-a-lie
http://www.environmentalhealthnews.org/ehs/news/2016/dec/endocrine-disruptors-a-denial-of-the-state-of-the-science
http://www.environmentalhealthnews.org/ehs/news/2016/dec/endocrine-disruptors-the-interference-of-the-united-states

[8] World Health Organization/United Nations Environment Programme. State of the Science of Endocrine Disrupting Chemicals. 2012. http://www.unep.org/pdf/WHO_HSE_PHE_IHE_2013.1_eng.pdf Accessed November 2016.

[9] TEDX -The Endocrine Disruption Exchange. Critical Windows of Development. Accessed November 2016. www.tedx.org

Comments & recommendations: draft assessments & risk management scope documents

Table 1 summarizes data from the draft screening assessments, draft state of the science reports and the proposed risk management scope documents, for the selected organic flame retardants - outcomes with respect to toxicity (section 64 criteria), persistence and bioaccumulation regulations and additions to Schedule 1, CEPA 1999.

Table 2 summarizes the volume usage in commerce, use as an alternative & proposed risk management for the selected organic flame retardants – data from the above mentioned sources.

Table 1: Certain organic flame retardants – proposals regarding section 64 CEPA & Persistence and Bioaccumulation Regulations criteria[10]

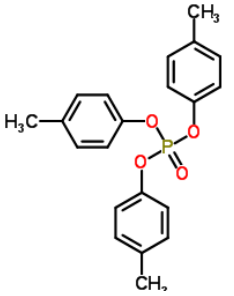
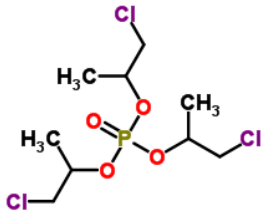
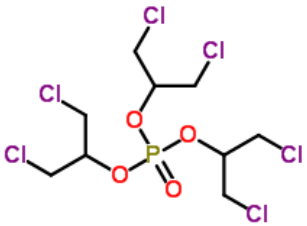
Substance CAS RN	**Section 64 CEPA 1999*** **a)**	**b)**	**c)**	**Persistence & Bioaccumulation Regulations CEPA 1999*** **P**	**B**	**Addition to Schedule 1 – List of toxic substances**
1,3,5-triazine-2,4,6-triamine **(melamine)** 108-78-1	X	X	X	X	X	X
phosphoric acid, tris(methylphenyl) ester (Tricresyl phosphate –**TCP**) 1330-78-5	X	X	X	X	X	X
2-Propanol, 1chloro-, phosphate (3:1) **(TCPP)** 13674-84-5	X	X	✓	✓	X	✓
2-Propanol, 1,3dichloro-, phosphate (3:1) **(TDCPP)** 13674-87-8	X	X	X	✓	X	X
1,4:7,10-Dimethanodibenzo[a,e]cyclooctene, 1,2,3,4,7,8,9,10,13,13,14,14-dodecachloro-1,4, 4a,5,6,6a,7,10,10a,11,12,12a-dodecahydro- (**Dechlorane Plus (DP)**) 13560-89-9	✓	X	X	✓	✓	✓

[10]Government of Canada. Certain Organic Flame Retardants Grouping. October, 2016. All information extracted from the Draft Risk Assessments, Draft State of Science Reports and the Proposed Risk Management Scope documents.
http://chemicalsubstanceschimiques.gc.ca/group/flame_retardant-ignifuges-eng.php

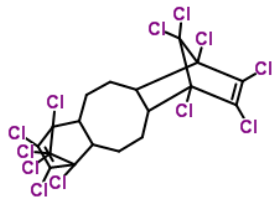
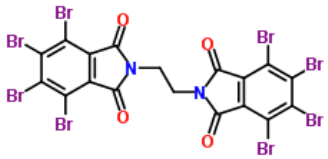
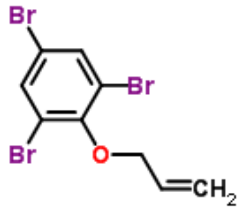
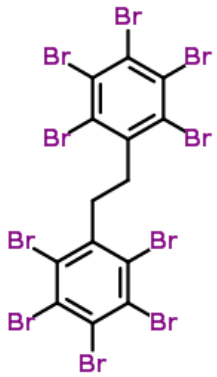
1H-isoindole-1,3(2H)-dione, 2,2'-(1,2-ethanediyl)bis[4,5,6,7-tetrabromo- **(EBTBP)** 32588-76-4	X X X	✓ X	X
Benzene, 1,3,5-tribromo-2-(2-propenyloxy)- **(ATE)** 3278-89-5	Present estimated levels of exposure of ATE are not indicative of harm to the environment or to human health. There may be concerns if import and use quantities were to increase in Canada.	Comment as under s.64	Not on the DSL, subject to NSNR.
Benzene, 1,1'-(1,2-ethanediyl)bis [2,3,4,5,6-pentabromo- Decabromodiphenyl ethane **(DBDPE)** 84852-53-9 & Transformation products of DBDPE - such as lower brominated BDPEs.	✓ X X	✓ X These products could be P, B and inherently toxic (iT).	Not on the DSL, subject to NSNR.
Benzoic acid, 2,3,4,5-tetrabromo-, 2-ethylhexyl ester **(TBB)** 183658-27-7 & 1,2 benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, bis(2-ethylhexyl) ester **(TBPH)** 26040-51-7	Present estimated levels of exposure of TBB and TBPH are not indicative of harm to the environment or to human health. There may be concerns if import and use quantities were to increase in Canada.	Comments as under s.64.	Not on the DSL. Subject to NSNR

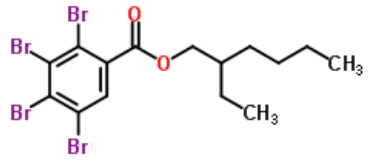
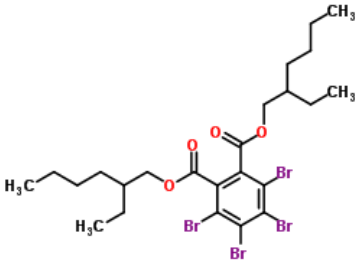
*Notes: (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; (c) constitute or may constitute a danger in Canada to human life or health; P = persistence, B = bioaccumulation; ✓ - meets the criterion/criteria; X – did not meet the criterion/criteria

Table 2: Usage in commerce, as an alternative & proposed risk management for certain organic flame retardants[11] Images retrieved from www.ChemSpider.com

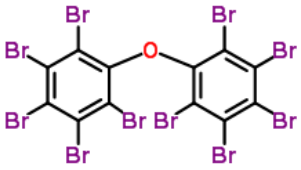
Substance	Proposed risk management
Melamine 108-78-1 	- Risk management not proposed - In use as a flame retardant in Canada - Well known as common hard plastic polymerized with formaldehyde using heat and a catalyst.
Tricresyl phosphate –TCP 1330-78-5 	- Risk management not proposed - Imported into Canada in 2011: 1 000 to 10 000 kg; in consumer or commercial products - 100-1 000 kg (ECCC 2013-2014). - The import volume of consumer or commercial products may be underestimated. - Not used in high quantities as a flame retardant in Canada. - TCP is an organophosphate used to stabilize aviation engine oil, and is a toxin in "fume events." Many people including pilots have become very sick with chronic illness following exposure to this acetylcholine esterase inhibitor. TCP was refused registration as an organophosphate insecticide because it is excessively toxic to mammals.
TCPP 13674-84-5 Proposed addition to Schedule 1  & TDCPP 13674-87-8 	Imported into Canada in 2011: estimated 1 000 000 -10 000 000 kg combined as a neat substance and in consumer, commercial or industrial products, but amounts could be higher. <u>Proposed risk management:</u> - TCPP: proposal to reduce dermal exposure of the general population in certain consumer products - specifically mattresses and upholstered furniture, limit TCPP to 1000 mg/kg (or 0.1 % w/w); - Significant data gaps: e.g. use in textiles, changes in use patterns, concentration levels required to meet performance-based flammability standards (including need for flame retardant chemicals in enclosed foams) and alternatives to TCPP for some applications (textiles & foam). <u>TCPP-TDCPP as an alternatives:</u> - TDCPP can be an alternative to TCPP in certain circumstances. TDCPP has hazardous properties - potential for carcinogenicity (Canada 2016) & non-cancer effects on the kidneys and testes - concerns if usage were to increase; - TCPP may be used as an alternative to TCEP (Tris(2-chloroethyl) phosphate) in polyurethane foams following concerns raised about the health effects of TCEP (EU 2008). Europe has proceeded with this substitution.

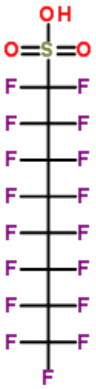
[11] Government of Canada. Certain Organic Flame Retardants Grouping. October, 2016. All information extracted from the Draft Risk Assessments, Draft State of Science Reports and the Proposed Risk Management Scope documents. http://chemicalsubstanceschimiques.gc.ca/group/flame_retardant-ignifuges-eng.php

Dechlorane Plus -DP 13560-89-9 	Imported into Canada in 2011: 1 to 10 tonnes for use as an additive flame retardant. Proposed risk management: - Proposal to reduce the concentration in the Canadian environment to the lowest level that is technically and economically feasible; - Significant data gaps: quantities & use, changing use patterns, chemical & non-chemical alternatives to DP. DP as an alternative: - Currently marketed as an alternative/replacement for decabromodiphenyl ether (decaBDE).
EBTBP 32588-76-4 	Imported into Canada in 2011: 1000 - 10 000 kg of neat substance; 10 000 - 100 000 kg in formulations and 100 000 - 1 000 000 kg in manufactured items. Proposed risk management: - None proposed Use as an alternative: - Considered a potential alternative for other flame retardants which are presently subject to regulatory controls in Canada and/or phase-out globally.
ATE 3278-89-5 	Imported into Canada in 2011: 100 000 - 1 000 000 kg. Assumed use: flame retardant. Subject to NSNR: increased usage levels in Canada will require pre-market notification for any new imports and manufacturing of ATE - Further restrictions could be put in place, if necessary. - Modeled data indicate that ATE will bioaccumulate in biota and it has the potential for biomagnification. Many data gaps. Use as an alternative: - Potential commercial alternative to other flame retardants, possible increased usage.
DBDPE 84852-53-9 	Imported in Canada in 2011: 1 000 - 10 000 tonnes, including DBDPE in formulations, consumer and commercial products. DBDPE exported from Canada in 2011 < 100 tonnes. Subject to NSNR: risk management measures (Ministerial Conditions) have been imposed on New Substance notifiers to mitigate potential risks to the environment, possibility of being “toxic”. Proposed risk management: - Concentration reduction in the Canadian environment to the lowest level that is technically and economically feasible; - Significant data gaps: quantity and use of DBDPE by Canadian manufacturers and importers, changing use patterns and economic impacts and chemical and non-chemical alternatives to DBDPE; DBDPE as an alternative: - DBDPE is likely the main alternative to decaBDE; - DBDPE is a potential alternative to HBCD, TBBPA, DP.

TBB 183658-27-7  & TBPH 26040-51-7 	Imported into Canada in 2011: 10 000 - 100 000 kg for each substance. Regulated under the NSNR: risk management measures (Ministerial Conditions) have been imposed on New Substance notifiers so that industrial releases are minimized, among other requirements. <u>Use as an alternative:</u> - TBB & TBPH: commercial alternatives to high-volume legacy flame retardants (PBDEs); usage in Canada could increase.

For reference, two substances proposed to be banned are decaBDE, illustrating the hazard associated with the brominated rings identical to TBPH





and the anti-stick chemical PFOS, illustrating the concern of even non-aromatic halogenated chemicals.

Comments and recommendations regarding the selected OFRs.

- **Structural similarities between flame retardants**

There are many factors that must be considered before a flame retardant can be used as an alternative for a toxic flame retardant, and several of the listed OFRs do not represent clearly "safer" choices to DP, decaBDE, HBCD and TCPP.

Many of the OFRs in Table 1 have high usage levels but significant data gaps. The continued usage of these substances is concerning since as seen in Table 2, the molecular configuration of many of these substances includes carbon-halogen bonds on aromatic rings, and substances with those configurations are generally capable of long-range travel potential, bioaccumulation, and toxic (human and environment) properties.

TBPH – a structural analogue of di(ethylhexyl) phthalate (DEHP), a known reproductive development toxicant, has a potentially toxic metabolite - Mono-(2-ethyhexyl) tetrabromophthalate (TBMEHP). Adverse effects of these brominated substances include thyroid dysfunction, liver dysfunction, and fetal testis maldevelopment.[12] Both TBB and TBPH are subject to risk management measures (Ministerial Conditions) so that industrial releases are minimized, but since they are commercial alternatives to high-volume legacy flame retardants (PBDEs), the usage in Canada could increase.

DBDPE is likely the main alternative to decaBDE because of its structural similarities. It is subject to NSNR and risk management measures (Ministerial Conditions) – so New Substance notifiers are relied upon to mitigate potential risks to the environment. There is also the possibility that it is "toxic". DBDPE is also a potential alternative DP.

TDCPP, a commercial alternative for PBDEs for some applications, is a known carcinogen in rats and also has the capacity to decrease sperm quality, count, and mobility, and produce genotoxic and neurotoxic changes.[13] TDCPP has been banned in several US states[14] but it is used in Canada with some risk management controls.

Clearly from this partial list of adverse effects, these OFRs affect endocrine function, yet these important outcomes, expressed often in a non-monotonic dose response at very low levels of exposure, do not impact the assessments. High throughput methods for chemicals are under development and validation, while mathematical approaches are also used for drug candidate selection. "Docking" of candidate chemicals on biologically important receptors such as estrogen, progesterone, androgen, thyroid, etc. can now be screened by anyone, free online, at https://mcule.com Although such tools cannot signal safety, a brief trial found flags for concerning chemicals. Clearly endocrine disruption must be more comprehensively considered for these polycyclic halogenated chemicals, some of which are already well known to be EDs.

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[12] Cecelia Springer, et al. Rodent Thyroid, Liver, and Fetal Testis Toxicity of the Monoester Metabolite of Bis-(2-ethylhexyl) Tetrabromophthalate (TBPH), a Novel Brominated Flame Retardant Present in Indoor Dust. Environ Health Perspectives; 120 (12). 2012. http://ehp.niehs.nih.gov/1204932/

[13] Endocrine Disruptors Action Group. Toxic by Design. October 2016. file:///C:/Environ%20-%20human%20health/Flame%20retardants/2016/toxicbydesign-oct25-lg.pdf

[14] Ibid

Organophosphates (OPs) are a well known class of acetyl choline esterase (AchE) inhibitor insecticides, some of which were recently classified as probable or possible carcinogens by the International Agency for Research on Cancer (IARC). It has been known at least since the 1950s that tricresyl phosphate, used as OP flame retardants, are similarly toxic.[15] This must be recognized in hazard assessment and risk management, and although these OPs are less halogenated (a desirable characteristic), this is not a basis to conclude that biological effects are innocuous.

- **Substitution with materials not requiring flame retardants, or if not possible then safer flame retardants**

In other jurisdictions such as Scandinavia, when a substance poses a hazard, the immediate response is to do the first step of environmental assessment –ask if the intended objective is necessary, and if so, determine the optimum manner to accomplish this objective. One illustration is the scandal over flame retardants revealed in the Chicago Tribune,[16] including the lack of efficacy and need, and limited considerations of substitutes.

Informed substitution with clearly safer alternative approaches, practices, materials and substances is not evident in the current flame retardant consultation. The proposed substitute OFRs offer little improvement with respect to toxicity, persistence, bioaccumulation, long-range transport potential properties, endocrine disruption and the potential to be carcinogenic. Even at lower levels of usage, this approach is not a sustainable solution to eliminate or reduce the present use of toxic OFRs. Rather, it will perpetuate and possibly increase usage levels for certain OFRs.

ATE, DBDPE, TBB, and TBPH are all subject to the NSNR. Any increases in usage for these substances could result in further risk management instruments because of human health and/or environmental concerns. Rather than taking actions to curtail these clearly questionable chemicals when “acceptability” rests on not exceeding an undefined usage threshold, the approach should be to minimize the use of these BFRs, and eventually to replace them with substantially safer alternatives.

Reviewing the proposed risk management instruments for many of these OFRs and possible substitutions, the approach to management of these substances is not sufficiently precautionary; nor does it adequately support pollution prevention. The proposed regulatory approach would continue to permit exposures to these substances. Indeed, it is hard to imagine that Canadians’ exposures will be greatly impacted directly by these measures, since manufactured items may still contain all PBDEs, including decaBDE.

Fire safety is definitely a concern for all, but it should not come at a cost to human health or the environment, and it is worse to suffer harms with no substantial

[15] Levels and Sources of Organophosphorus Flame Retardants and Plasticizers in Indoor and Outdoor Environments. https://www.diva-portal.org/smash/get/diva2:144103/FULLTEXT01.pdf
[16] “Playing with fire” http://media.apps.chicagotribune.com/flames/index.html

improvement in fire safety. The inclusion of some types of flame retardants in furniture poses problems for firefighter health and safety as the flame retardants result in increased emissions of carbon monoxide, soot and toxic gases, such as toxic dioxins and furans.[17] As a result, firefighting groups in the United States are working towards the removal of flame retardants from furniture and building materials.[18]

- **Flammability standards**

The *Canada Consumer Product Safety Act* (CCPSA) sets out performance-based flammability requirements for mattresses and other textile products that are imported, sold or advertised in Canada but it does not state how requirements are to be met. The flammability standards as prescribed for any class of products are not necessarily representative of real-life fire incidents. Such an example would be the use of an open flame to test flammability of upholstered foam furniture. The smoldering flame test better replicates a fire in upholstered furniture that was likely initiated by a lit cigarette. Also, differences in technical parameters for various tests affect the performance of a product.

The open-flame and the smouldering flame tests are used for furniture, with the former standard possibly being met with large quantities of flame retardant in the foam. The latter may require less flame retardant or be satisfied merely with the incorporation of a material that has an inherently low flammability, possibly for encasing foam.

The use of flame retardants in upholstered foam furniture continues to be controversial, as a study by the US Consumer Product Safety Commission found that "the fire-retardant foams did not offer a significantly greater level of open-flame safety than did the untreated foams."[19] Similarly, two other studies found that flame retardants "made no significant, consistent difference in either ignition or flame spread."[20]
While this debate continues, we continue to be exposed to BFRs in our environment. Individuals do not have a choice; but the government has more options:

1. Manage the risks of BFRs more aggressively, including
    a. encouraging use of naturally flame resistant materials, and
    b. employ flame retardants only when they are confirmed to confer substantial benefits;
2. Ensure that alternatives are safe for Canadians and the environment.

Recommendations:

- Structural similarities in current and alternative flame retardants should flag potential related hazards, even if not thoroughly researched. Potential endocrine disruption by polycyclic aromatic chemicals – not currently thoroughly assessed – is an essential consideration to determine whether the alternative flame retardant is indeed a safer choice.

[17] Endocrine Disruptors Action Group. Toxic by Design. October 2016.
file:///C:/Environ%20-%20human%20health/Flame%20retardants/2016/toxicbydesign-oct25-lg.pdf
[18] Ibid.
[19] Ibid.
[20] Ibid.

- There should be a high level of certainty that any alternative flame retardant will have no adverse impacts on the environment and human health. All significant biological effects should be considered adverse by default.
- The primary objective for safer substances and alternatives including flame retardants should be to avoid toxicant releases and exposures as identified in a hazard assessment. The most effective, efficient, pragmatic approach is to identify inherently safest, least-toxic, most sustainable means to achieve an end. Use of naturally flame retardant materials such as metal rather than plastic is an obvious example. If a substance is truly needed for a necessary function, at that point verified safer, more sustainable options (when they exist) would be given the market. When a substance is identified as unacceptable for some or all applications, a process for Informed Substitution would mirror this up-front process to define the objective and determine optimum results-based options for all substances.
- The above rationale and approach would result in use of flame retardants and alternative flame retardants that are hazardous to the environment or human health, being prohibited from use in consumer products and parts to be used in consumer products, at any level of usage.
- Develop a plan to reduce and to eliminate the potential releases of brominated flame retardants and other persistent toxicants during recycling and disposal.
- Consult with industry on the use of alternative methods/materials to address flammability concerns, and when necessary, safer alternative flame retardants.
- The government should review the validity of flammability standards, and impacts of the standards as they relate to CEPA and its mandate. Pollution prevention should be the driver so that safer alternatives and substances are used.
- Hazardous chemicals should not be used when no benefits in lives or property saved actually accrue, while firefighters' health is put at further increased risk.
- Some BFRs are *known* to disrupt hormonal systems, whereas less is known about other BFRs and their breakdown products. More aggressive and positive actions by the government are required in approaches to recognize, assess, eliminate and where necessary, substitute endocrine disrupting chemicals. Monitor the concentrations of flame retardants in humans, foods and the environment, including the Great Lakes, to assess the effectiveness of risk management strategies and to provide data for an environmental health information infrastructure.
- Recognize that health, environmental and socio-economic costs of continuing to permit chemicals in products – not only production and import – impact Canadians including workers and our children.

Respectfully submitted by:

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