Heather Tenney
Massachusetts Toxic Use Reduction Institute
The Offices at Boott Mills West
126 John Street, Suite 14
Lowell, MA 01852

Dear Ms. Tenney

Re: Massachusetts TURA SAB Request for Information on Flame Retardants

The American Chemistry Council's ("ACC") North American Flame Retardant Alliance ("NAFRA")[1] is providing these comments in response to the Massachusetts TURA SAB's Call for Information Regarding Flame Retardants.

NAFRA offers these comments to inform the SAB's evaluation of specific substances, including the assessment of CAS#, isomers and analogues, as well as any consideration of potential additional substances for the Massachusetts Department of the Environment to evaluate under Regulation 310 CMR 78.00.

As the SAB analyzes various substances and assesses any potential recommendations related to additional substances, NAFRA emphasizes the following key points to inform the SAB's review:

1. Any proposed consideration of additional flame retardants should take into account whether these materials are likely to be used in the identified products regulated under 310 CMR 78.00. Several of the specific substances and subclasses are unlikely to be used in the covered applications and this could help inform the scope of the SAB's review and also help focus any recommendations.

2. Any proposed consideration of additional flame retardants and subclasses should be based on the current state of the science and recognition that not all flame retardants are the same even within specific subclasses. Specifically, as the SAB evaluates the seven identified subclasses, it should analyze the structure, physico-chemical properties, composition, computational bioactivity profiles, toxicokinetics, mechanism/mode of action (similarity in eliciting molecular initiating events, key intermediate events, and other relevant in vitro information and data), and available traditional toxicological and ecotoxicological testing data to determine if the state of the science indicates that members of the subclass are likely to all show the same type and approximate value for

[1] The American Chemistry Council's North American Flame Retardant Alliance represents the leading producers of flame retardants used in a wide variety of industrial and consumer applications. NAFRA members represent cutting edge fire-safety chemistry and technology and are dedicated to improving fire safety performance in key product applications. NAFRA members include Albemarle Corporation, ICL Industrial Products, and Lanxess. For more information on NAFRA, visit North American Flame Retardant Alliance (NAFRA) (americanchemistry.com).

the specific toxicological or other property that is to be inferred. Any substances that do not clearly meet these factors should be excluded.

As the SAB discussed at its February meeting, chemicals are unique with respect to both hazard and potential exposures, sometimes even within a specific subclass. This was partially acknowledged by the NASEM scientific panel when they outlined the discordant data sets within a subclass. While using a subclass approach may be the most expedient approach, NAFRA recommends a strong measure of caution extending the findings regarding one chemical to all species within a subclass and urges the SAB to conduct a more thorough review as outlined above.

As part of this analysis, there is ongoing work by the U.S. Consumer Product Safety Commission and the U.S. EPA relative to some of the subclasses that could be useful to inform the SAB's review and this should be taken into account.

Attachment 1 of these comments provides some specific feedback om the various sub-classes and specific substances.

3. Any recommendations for additional substances to be evaluated for potential regulation should taking into account the actual use phase and should focus on additive, non-polymeric flame retardants. While use of subclasses may be appropriate for screening purposes and to inform general chemical assessments, they may not be appropriate for regulatory purposes and risk management actions. Any proposed regulations should take into account how specific substances are used and actual exposure. This should include differentiation between additive substances versus polymeric and reactive flame retardants and any recommendations for additional regulation should focus on additive, non-polymeric substances.

   Flame retardants can be liquids or solids, and can be physically incorporated into a material (additive) or chemically transformed to create a new fire-resistant material (reactive). Additive flame retardants are incorporated into compounds via physical mixing. Compounds containing flame-retardant elements are mixed with existing polymers without undergoing any chemical reactions. By contrast, reactive flame retardants are incorporated into polymers via chemical reactions. The production of existing polymers is modified so that one or more unsubstituted reactant monomers is replaced with a substituted monomer containing flame-retardant heteroelements. The substituted monomers and their heteroelement components become an integral part of the resulting polymer structure.[2]

   States and federal regulatory bodies have differentiated between additive and reactive applications when considering regulations for flame retardants and have focused on additive applications. Likewise, a broad range of stakeholders, including key non-governmental organizations have recognized that "due to their high molecular weights,

[2] U.S. Environmental Protection Agency, "Flame Retardants in Printed Circuit Boards," Chapter 3, Page 2. https://www.epa.gov/sites/production/files/2015-08/documents/pcb_final_report.pdf

polymeric organohalogen flame retardants are believed to be not readily bioavailable" and have advocated that "the focus should be on non-polymeric chemicals only since additive (as opposed to reactive) flame retardants are not chemically bound to the products containing them, thus they can potentially migrate out of products, resulting in human exposure."[3]

4. Any proposed consideration of subclasses should ensure that all specific substances meet the specific criteria outlined in the underlying statute and 310 CMR 78.00 taking into account use and exposure considerations noted above.

Finally, the document that was circulated regarding Flame Retardant CAS #s, isomers and analogues references a "Definitions and Questions" document. Is this document publicly available for review? If so, we would welcome the opportunity to provide any input and help further inform this.

Thank you for your consideration and the opportunity to provide input to the call for information. We be soliciting any additional supporting information from our members and will plan to highlight this at the May 12th SAB meeting.

Sincerely,

Robert J. Simon
Vice President, Chemical Products and Technology
On behalf of the North American Flame Retardant Alliance

[3] Consumer Product Safety Commission Petition HP 15-1 Requesting Rulemaking on Products Containing Non-Polymeric, Additive Organohalogen Flame Retardants, July 1, 2015

Attachment 1

Specific Feedback on of CAS#, Isomers and Analogues

Subclass 1: Polyhalogenated Organophosphates

- Tris (tribromoneopentyl)phosphate – This substance is not an appropriate analogue. The structure and addition of a methyl group to each chain differentiates this substance from the subclass.
- Bis(2,3-dibromopropyl)phosphate – This substance is not an appropriate analogue. The substance is not a full ester and this differentiates he substance from the subclass.
- Bis(2-chloroethyl)2-chloroethyphosphonate – This substance is not an appropriate analogue. This has a completely different oxidation state of phosphorous and this differentiates the substance from the subclass.
- TCPP – This substance is not likely relevant for the "covered products/applications" and has a different profile so should not be included with this subclass.

Subclass 3: Polyhalogenated Alicycles

- 1,2,3,4,5-Pentabromo-6-chlorocyclohexane – This substance has a completely different structure and is not an appropriate analogue for this subclass.

Subclass 4: Polyhalogenated Phthalates/Benzoates/Imides

- 2-(2-hydroxyethoxy)ethyl-2-hyroxypropl-3,4,5,6-tetrabromo phthalate – This is not an analogue of TBPH. This substance is a derivative of phthalic anhydride and is a reactive use so it is completely different.
- 2-(2-hydroxyethoxy)ethyl-2-hyroxypropl-3,4,5,6-tetrabromo phthalate mixed with esthers – This is not an analogue of TBPH. This substance is a derivative of phthalic anhydride and is a reactive use, so it is completely different as noted above. This substance should never be an issue since it will become a polymer in use.
- Tetrabromophthalic acid dimethyl ester – Very few literature references and does not appear to be used as a flame retardant.
- 2-ethylhexal 2,3,4,5 (TBB)- This substance is a reactive chemical and is likely to become part of a polymer backbone if it is ever used.

Subclass 5: Polyhalogenated Phthalates/Benzoates/Imides

- 4-4'-isopropylidenebis – We do not believe this is a useful flame retardant structure. Adding ethanol extensions to TBBPA serves no useful purpose.
- 2,2-Bis[3,5-dibromo-4-(2,3-dibromopropoxy)phenyl]propane – This is a derivative of TBBPA rather than an analogue but have no opposition to inclusion.
- 1,1"-(isopropylidene)bis(3.5-dibromo-2-methylpropoxy)benzene – This is a derivative of TBBPA rather than an analogue but have no opposition to this being approached.