European HBCD Industry Group and EUMEPS position on the appropriate low POP content limit for HBCD in Polystyrene Foam waste

Brussels, March 2018

1. Introduction and Summary

The European HBCD Industry Group and EUMEPS would like to consolidate comments and information on the low persistent organic pollutant (POP) content values for hexabromocyclododecane (HBCD) included in the General Technical Guidelines on the Environmentally Sound Management of Wastes consisting, containing or contaminated with POPs[1].

The European HBCD Industry Group and EUMEPS are of the strong opinion that for HBCD the most appropriate low POP content limit ought to be 1000 mg/kg. A low POP limit of 1000 mg/kg is practical, pragmatic and environmentally sound. It will ensure both the protection of human health and of the environment. It can be implemented by the stakeholders in the waste management sector easily and effectively enforced by the Parties.

- A low POP content of 1000 mg/kg for HBCD captures all flame retarded polystyrene foam wastes from demolition[2], since such foams contain HBCD above 5000 mg/kg (EPS contains on average 5000-10000 mg/kg HBCD and XPS contains on average 8000-25000 mg/kg HBCD). A limit of 1000 mg/kg would therefore allow the destruction of HBCD incorporated in such flame retarded polystyrene foams.
- At present no robust analytical method for HBCD exists to provide satisfactory reproducible results at 100 mg/kg. A low POP limit any lower than 1000 mg/kg would make the analysis of the substance in polystyrene foam waste unnecessarily challenging, time consuming and costly, due to adequate sample preparation and extraction. Specifying a POP limit level of 100 mg/kg cannot be easily enforced, controlled and reported.
- A 1000 mg/kg limit would allow for the recycling of polystyrene foams which are not expected to contain HBCD. Packaging polystyrene foams typically do not contain HBCD, as flame retarded properties are generally not required in these applications. Levels of HBCD in such waste streams, due to possible contamination, are expected to be far less than 1000 mg/kg. Combined with the cost of analysis, a low POP limit of 1000 mg/kg will therefore contribute in maintaining the economic viability of recycling of polystyrene foams.

[1] Available at: http://www.basel.int/Implementation/Publications/LatestTechnicalGuidelines/tabid/5875/Default.aspx

[2] For Parties that have registered to make use of the exemption, the same would apply for HBCD-containing waste from construction

- HBCD, being firmly incorporated in the stable polystyrene matrix, is not readily released from PS foam waste and hence the impact on the environment and human health is negligible [3,4,5].

- A 1000 mg/kg limit ensures alignment with the limit values deemed safe in national or international regulations, such as the EU POP Regulation [6] which specifies a low POP limit of 1000 mg/kg for HBCD and EU REACH which defines a level of 0.1% w/w for articles containing substances of very high concern (SVHC). Other EU legislation, such as the EU RoHS and WEEE Directives, also set an allowed threshold limit of 1,000 mg/kg for the sum of PBDEs.

This document lists a number of arguments in support of a 1000 mg/kg low POP limit for HBCD, based on the key considerations included in the 'Supporting document for the development of section III of the General Technical Guidelines'[7].

2. Analytical methods for HBCD in Polystyrene Foam waste

In the absence of an agreed standard methodology to accurately evaluate and measure HBCD levels in PS foams, the European industry has developed and validated a robust, cost-effective and accessible analytical methodology, which allows operators to identify HBCD with confidence and accuracy to a level of 1000 mg/kg. Work was completed in 2016 to provide for such a method and related information has been made available on the website of the Basel Convention[8]. The methodology was forwarded for consideration under international standardisation[9].

Having to measure and quantify HBCD at a level of 100 mg/kg will require much more sophisticated and hence less accessible and affordable analytical technology. At these low levels reproducibility as well as accuracy is much more critical, because standard deviations have a greater impact at such levels. As a matter of fact, ongoing investigations by industry and other bodies provide evidence that the analytical capabilities may fail to deliver robust and economically viable results based on sound standard operating procedures (SOPs) at these low levels. Therefore, specifying a low POP limit level of 100 mg/kg has to be questioned in relation to enforcement, control and reporting.

[3] ECHA 'Data on Manufacture, Import, Export, Uses and Release of HBCDD as well as information on potential alternatives to its use'. 2009 https://echa.europa.eu/documents/10162/13640/tech_rep_hbcdd_en.pdf

[4] PlasticsEurope, Exiba, EFRA, CEFIC: 'HBCDD Hexabromocyclododecane in Polystyrene Foams Product Safety Assessment' 2016 (submitted to UNEP Secretariat together with this paper)

[5] 'Basic Information – HBCD-containing polystyrene rigid foam insulation panels' by BG BAU (German Employers' Liability Insurance Association for the Construction Industry) http://www.bgbau.de/gisbau/aktuell/copy_of_basisinf_HBCD_2016_12_15.pdf

[6] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:JOL_2016_055_R_0003&from=EN

[7] UNEP/CHW/OEWG.9/INF/9/add.1. Available at: http://www.basel.int/TheConvention/OpenendedWorkingGroup(OEWG)/Meetings/OEWG9/MeetingDocuments/tabid/3684/Default.aspx

[8] http://www.basel.int/Implementation/POPsWastes/TechnicalGuidelines/tabid/5052/Default.aspx

[9] Standard EN 62321-9 being developed under IEC TC111 WG 3

3. Environmental impact of Polystyrene Foam waste

HBCD, being firmly incorporated in the stable polystyrene matrix, is not readily released from PS foam waste (containing HBCD) to the environment, be it to air, water or soil, and hence the environmental impact is minimal[10]. Therefore, the dismantling, transport or disposal of the waste foams does not have negative impacts for the environment. For example, this was confirmed by the implementation of the German POP Waste Monitoring Ordinance (POP-Abfall-ÜberwachungsVerordnung) that entered into force on 1st August 2017[11]. It guarantees that specifically PS foam waste containing HBCD and other waste containing POPs are permanently disposed of in a way that is safe for the environment. No additional safety measures were pronounced. The industry's 7-year environmental monitoring programme has provided further evidence for a trend of decreasing levels of HBCD found in the environment in support of the minimal environmental impact of PS foams containing HBCD[12].

Hence, a POP limit of 1000 mg/kg provides for the necessary margin of safety and can be regarded as appropriate for meeting environmental concerns. A low POP limit value of 1000 mg/kg will suffice to maintain the downward trend of HBCD in the environment, given that following the listing of HBCD under the Stockholm Convention, the use of HBCD in products is being discontinued worldwide.

4. Potential health considerations from handling Polystyrene Foam waste

As concluded in the 2008 EU risk assessment[13], while risk reduction measures should be applied when handing HBCD, PS foam waste containing HBCD can be handled without any particular risk to workers and to consumers.

5. End of Life scenarios for Polystyrene Foam waste

The options for the end of life management of PS foams very much follow the generic hierarchy applied for (plastic) waste materials: prevention, preparing for re-use, recycling and other recovery. Landfill is considered the least sustainable option for PS Foam waste.

For waste of PS foams containing HBCD, Advanced Solid Waste Incineration (ASWI) represents one of the disposal methods of choice for the elimination of HBCD, as acknowledged in the Basel General Technical Guidelines on POPs Waste adopted in May 2015[14] and supported by the EU[15]. To this end, European industry carried out in 2015 an

---

[10] ECHA (ibid); and PlasticsEurope, Exiba, EFRA, CEFIC (ibid)

[11] Available at: https://www.gesetze-im-internet.de/pop-abfall-_berwv/BJNR264410017.html

[12] H. Rüdel et al Rüdel, J. Müller, M. Quack, R. Klein, 2012: *Monitoring of hexabromocyclododecane diastereomers in fish from European freshwaters and estuaries*. Environ. Sci. Pollut. Res. 19, 772-783; and Rüdel H, Nowak J, Müller J, Ricking M, Quack M, Klein R: 'HBCD diastereomer levels in fish and suspended particulate matter from European freshwater and estuary sites - environmental quality standard compliance and trend monitoring', presentation at SETAC 2014 (A final publication summarising all the data from the environmental monitoring programme is expected to be published soon)

[13] ECHA '*Risk Assessment: Hexabromocyclododecane. Final Report*'. May 2008, Conclusion 5.2.3, p. 476

[14] Available at: http://www.basel.int/Implementation/Publications/LatestTechnicalGuidelines/tabid/5875/Default.aspx

[15] Letter by the European Commission to Mr Edmar Meuwissen, Secretary General of EUMEPS of 10 July 2014, states that: *"Incineration in an incinerator complying with BAT (with energy recovery) shall be the main disposal option as the results of studies show that a high destruction efficiency can be achieved and the flue gas emissions would comply with EU legislation"*.

extensive investigation in a state of the art ASWI which demonstrates a destruction efficiency for HBCD of 99.999%[16].

Equally, as acknowledged in the Basel General Technical Guidelines on POPs Waste, cement-kiln co-incineration provides the means to destroy brominated flame retardants with high efficiency. Considering the high temperatures and the long residence times found in state of art cement kiln co-incineration facilities, it is expected that HBCD contained in PS foams will also be destroyed.

Furthermore, for collected EPS and XPS, the PolystyreneLoop process is under development whereby the HBCD is separated from the PS foams under strictly controlled conditions via dissolution. The clean PS is being recycled whilst the HBCD becomes destroyed along with the recovery of bromine. A full-scale plant will be operational in 2019 in the Netherlands.

A low POP limit of 1000 mg/kg will be adequate to capture all HBCD-containing PS foams from demolition waste, since such foams have POP levels in excess of 5000 mg/kg, and will ensure their destruction applying a recognised destruction technique such as ASWI.

When taking a building down it is advisable to identify the categories of foams beforehand, to remove the foams and to collect the foams for further handling according to best practice. This prevents the dispersion of foam particles from EPS or XPS containing HBCD.

6. Economic considerations

A low POP level of 1000 mg/kg represents a solid basis to ensure that all PS foam waste from demolition containing HBCD is channelled to destruction, providing for a sound and responsible end of life management of the HBCD-containing PS foam waste.

Considering circular economy aspirations as expressed by all engaged stakeholders, the low POP content limit ought to be such that it allows for the recovery and recycling of PS foams which do not contain HBCD. Even though investigations have shown that waste fractions of EPS packaging can contain HBCD, levels of contamination are comparatively low.

Considering the effectiveness, the cost and the logistics of analysis, a low POP limit of 1000 mg/kg allows for a manageable recycling of PS foams which are not meant to contain HBCD. A level lower than 1000 mg/kg is likely to bring such recycling operations economically off balance whilst endangering their compliance obligations. Furthermore, additional costs will result from an increase of the amounts of PS foams that would have to be incinerated, including also valuable foams that do not contain any HBCD. Therefore, lower levels than 1000 mg/kg are likely to hinder the achievement of recycling targets and the transition to a circular economy.

[16] Mark, F.E. et al, 2015. "Destruction of the flame retardant hexabromocyclododecane in a full-scale municipal solid waste incinerator", *Waste Management & Research,* vol. 33 No. 2, pp. 165–174; and Vehlow, Jurgen 'End-of-Life Treatment of HBCD-containing polystyrene insulation foams: Technical Summary Report' PlasticsEurope, 2015

7. Conclusion

A low POP level of 1000 mg/kg is practical, effective, pragmatic, environmentally sound and enforceable. It achieves the destruction of the vast majority of HBCD as contained in demolition waste foams since such foams contain HBCD above 5000 mg/kg) while it supports the economic viability of recycling polystyrene foam wastes that do not contain HBCD.

Any limit lower than 1000 mg/kg will pose significant and possibly disruptive challenges for the polystyrene value chain and would create a negative precedent for the whole of plastics recycling industry. Such impacts should be carefully considered.

Yours sincerely,

Dr Smadar Admon

Chair of the European HBCD Industry Group

Edmar Meuwissen

Secretary General of EUMEP

The European HBCD Industry Group gathers HBCD producers and users in the polystyrene insulation foam sector, the major application of HBCD. The HBCD producers are represented by BSEF (the International Bromine Council) and the HBCD users in the polystyrene insulation industry are members of PlasticsEurope (for expandable polystyrene) and Exiba (for extruded polystyrene).

The European Manufacturers of Expanded Polystyrene (EUMEPS) is an association which supports and promotes the European EPS industry through National Associations. It is divided into two interest groups, reflecting the main applications for Expanded PolyStyrene (EPS): Packaging and Building & Construction. Membership of EUMEPS is open to the National Associations, raw material producers and multinational converters of EPS.