EERA Statement on the limit values for unintentional trace contaminants (UTC)

'one substance – one assessment'

The European Electronics Recyclers Association (EERA) is the voice of professional waste electrical and electronic equipment (WEEE) operators in the continent of Europe. Our Members represent Europe's leading collection, recovery, recycling, and end-processing / reprocessing industries, thus covering the entire chain of e-waste operations from the discarding of WEEE by consumers and businesses to the recovery of secondary materials such as copper, precious metals, and plastics.

EERA wishes to make the following statement and recommendations in regard to the proposals under consideration for amendments to the limit values for unintentional trace contaminants (UTC).

Article 1 of Regulation (EU) 2019/1021 ('POP Regulation') establishes as the objective of that Regulation to protect human health and the environment from Persistent Organic Pollutants ('POPs') by prohibiting, and phasing out as soon as possible, and restricting the manufacturing, and placing on the market and use of substances subject to the Stockholm Convention on POPs. It is notable that PBDEs are flame retardants predominantly found in plastics used in electrical and electronic equipment, and hence **EERA's** focus and the following comments:

Point 1: **EERA** notes that the provisional agreement to lower the LCPL limits, initially to 500 mg/kg at entry into force was made in June 2022, and that it is envisaged that further reductions will come into force to 350 mg/kg three years later and to 200 mg/kg five years later, provided that the limit value to place this substance on the market is not higher.

The European Council and Parliament provisionally agreed the above on the 20th June 2022. The remaining compromise, which the Commission have now opened, is the proposal to lower the UTC level to 200 mg/kg for the PBDE group of substances.

As has been mentioned to the Commission earlier this year by our Plastics Expert, Mr Chris Slijkhuis, screening technology available today at state-of-the-art end-processors / reprocessors for e-waste derived plastics can reach 500 mg/kg, but not yet the lower 200 mg / kg proposed. **Changes will take time, innovation, and investment and economic certainty.**

Mattia Pellegrini (DG ENV) wrote to **EERA** on the 1st July 2020 regarding policy action and priorities regarding e-waste and told us that the Commission were launching a study[1] under the 'Single Use Plastic Directive'.

[1] https://www.eunomia.co.uk/eunomia-to-explore-options-for-measuring-recycled-content-across-europe/

This commenced in November 2020. The objective was to include the development of a calculation and verification method to measure the recycled plastics content. The consultants noted that "*Whilst the primary aim of the project is to set the conditions for measuring recycled content of plastic beverage containers under the Single Use Plastics Directive, it will undoubtedly become the benchmark for how measurement is undertaken across the board.*"

This approach must be considered in the context of the discussions on UTC limits, as given the expertise of our specialist plastic reprocessing facility Members, and the views and experience of our collaborative partners (PRe, EuRIC, BSEF et al.), **EERA** argues that to implement this lower limit value for UTCs at this time will in effect bring the innovation and recycling of WEEE derived plastics, as well as plastics from end-of-life vehicles and other plastic products and components to a halt.

Since June **EERA** has carried out further collaboration with the HBCD Industry Group2 on the validity of the proposed test standard (EN 62321) and in particular, the application of X-ray fluorescence spectrometry for measuring total bromine in plastic substrates containing brominated flame retardants (BFRs), and some work is underway within the EU-funded CREATOR project, the conclusions of which we hope will be available before the forthcoming POPCA on 24th November this year.

PBDEs are of course mainly used in electronic applications in a multitude of different polymer matrices and often in combination with many other additives, and HBCD, that today is mainly found in EPS material (mono-material with a mono-additive) and that was also used to a small extent in HIPS (High impact polystyrene) until about 2014.

The presences of additives, fillers and different flame retardants are likely to influence (negatively or positively) test results, which cannot be determined at the start of the reprocessing operations.

- **EERA** advocates that it is vital for all stakeholders to ensure that there is a **scientific approach**, backed with validated tests using certified test methods and that are applicable to all plastic streams as often plastic inputs to end-processors are mixed.

  This must be in place **before** any new limits are imposed, only then can there be the assurances that the limit value is measured in the same way in each Member State.

[2] 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 Plastics Europe (for expandable polystyrene) and Exiba (for extruded polystyrene).

- The HBCD Industry Group are in the process of preparing of a paper related to **X-ray fluorescence spectrometry**, which will be available in due course. Please see **Appendix A** for further details on the relevance of validated test standards.

Consideration must also be given that in the absence of a validated analytical method, legal uncertainties may exist in respect of any enforcement actions by the regulators. Without verifiable evidence, responsible recyclers could be required to adopt a more precautionary approach and divert materials to incineration or landfill, both of which are very limited in capacity today, with some Member States having no capacity at all.

Another unintended consequence should this lower limit be ratified, is that the achievement of recycling/recovery targets (imposed on EEE producers and WEEE recyclers as set down in the WEEE Directive) is highly doubtful if all plastics have to be diverted to waste disposal routes.

Furthermore, research into plastic recycling[3] routes shows that this action is also likely to cause an increase in the volume (estimated at 50%+ / 1.43 mt in 2020) of undocumented and illegal routes and/or diluted waste exports out of Europe. Mechanical recycling within Europe is the best possible option for resource, recovery and retention and climate change points of view.

- Thus the intentions of the European Union and the **objectives** set down in Article 1 of the POPs Regulation to protect human health and the environment by removing plastics containing POPs from the circular chain will be **counterproductive**.

The substance group of the PBDEs has been restricted since 2006 in Electric and Electronic Equipment in the first version of the Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (RoHS). Several studies have shown that the quantities of PBDEs in steadily going down. **The most effective way of speeding up the phase out of PBDEs is to make sure that more WEEE plastics are recycled in specialised recycling facilities**.

The effective concentrations of the legacy substance group of the PBDEs have been in the order of magnitude of 150 000 ppm. The current legal threshold values in the European Union are between 500 ppm (UTC threshold value) and 1000 ppm (RoHS and REACH).

This means that a proposal of a further reduction of the legacy substance group of 150 – 300 ppm, would be a reduction of a further 0,1 - 0.2 % compared to the effective concentrations in end-of-life electrical and electronic equipment (WEEE).

This will make it hard if not impossible to prove legal compliance to final customers by the recyclers as this level is beyond the accuracy level of the XRF measurements.

[3] Study on the Impacts of Brominated Flame Retardants on the Recycling of WEEE plastics in Europe SOFIES 2020 *https://www.bsef.com/wp-content/uploads/2020/11/Study-on-the-impact-of-Brominated-Flame-Retardants-BFRs-on-WEEE-plastics-recycling-by-Sofies-Nov-2020-1.pdf*

Point 2: The Convention and the POPs Regulation (cf. Art 4 (1) (b)) generally exempts "*substances occurring as an unintentional trace contaminant in substances, preparations or articles*". The Regulation set down that for the PBDEs listed in Annex I of the EU POP Regulation (*tetraBDE, pentaBDE, hexaBDE, heptaBDE and decaBDE*), an unintentional trace contaminant (UTC) value would be set individually as 10mg/kg. The POPs Regulation defines the thresholds on three different levels:

- **substance**: means a chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition;

- **mixture**: means a mixture or solution composed of two or more substances;

- **article**: means an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition;

Thus, according to the above definitions, recycled plastic **is considered a mixture**. This was further clarified with a specific exemption within Part A of the Annex IV, which states *"for the purposes of the entries on tetra-, penta-, hexa-, hepta- and decaBDE, point (b) of Article 4(1) shall apply to the sum of the concentrations of those substances up to **500 mg/kg** where they are present in mixtures or articles…."*

- **EERA** wants the Commission to apply **both mixtures and articles** in the definitions within the Annexes in the POPs Regulation so that there is clarity for the industry and regulators.

Point 3: EERA appreciates and fully supports the premise that a fixed threshold facilitates uniform enforcement and control and provides legal certainty to economic operators. Within the European Green Deal, signed in December 2019, this is also advocated in section 2.1.8 that states that in order to ensure a **toxic-free environment**, the Commission will present a chemicals strategy for sustainability with the intention of moving towards having '**one substance – one assessment'** in order to provide greater transparency when prioritising action to deal with chemicals.

- **EERA** strongly supports this approach, as ensuring that UTC for recycled materials and LCPL limits are the same will meet the objective of having '**one substance – one assessment'** and is essential, in particular, to the reprocessing of plastics derived from WEEE recycling and recovery of quality secondary materials.

Final Recommendation: In light of our above comments EERA are advocating for an alignment between Annex IV and Annex I of the POPs Regulation. To be clear:

- EERA are asking for a **stable UTC limit in Annex IV to be set at 500 ppm for the sum of the PBDEs for at least three years after entry into force, and that any change should only be made following a risk-based assessment of the potential threats that may still be in place at that time, and provided a sufficiently robust analysis methodology is developed and validated to replace the ones from currently available standards, which are now proven to be flawed when it comes to recycled materials.**

For and on behalf of EERA

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END: 26/10/22

Appendix A follows

APPENDIX A

XRF Spectrometry Assessment

The HBCD Industry Group, with whom **EERA** is exchanging views on this topic, is in the process of preparing a paper related to X-ray fluorescence spectrometry, which will be available in due course. The measurement accuracy of XRF is limited as is clearly outlined by multi-laboratory validity tests. Current work is being undertaken by the EU Funded CREATOR project to re-quantify this granularity and accuracy of XRF measurements.

The following comments are made in respect to the proposals made by the EU Commission DG ENV related to the UTC threshold values for articles (particularly recycled plastic materials), which have become a very serious concern to the recycling industry, including EERA Members with specialised WEEE plastics end-processing operations (including MGG Polymers, Coolrec Plastics, Sostenplas, Bage Plastics, Induplast and others). This industry is not only relatively small, but also particularly new, with specialised recycling facilities only coming into operation at the start of the WEEE Directive (2006).

Standards.

With the implementation in 2006 of the Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (RoHS) simple but robust screening methods were needed to quickly identify the RoHS compliance of products being placed on the market.

This resulted in the Standard **EN 62321:2009 Electrotechnical Products,** which was validated for the RoHS threshold values by a multi-laboratory validation process. This Standard defines the determination of certain substances in electrotechnical products by screening a number of elements (lead, mercury, cadmium, total chromium, and total bromine) by X-ray fluorescence spectrometry

The current RoHS threshold value for the important group of PBDEs is 1000 ppm; and the validated test method is therefore validated to this limit. It is important to mention that this test-method assumes that all measured elemental Bromine is to be attributed to the restricted brominated substances.

There are several other Standards that include the screening for Bromine levels as tracer for restricted brominated flame retardants, although it must be mentioned that the relative occurrence of restricted brominated flame retardants, particularly in the PBDE group, is reducing quickly, since the RoHS Directive prohibited the use of PBDEs in electronics and electrical equipment since July 2006. The Standards examined are:

EN 50625 series

Collection, Logistics & Treatment requirements for WEEE - Part 1: General treatment requirements and *Part 3.1 General Depollution.* This Standard series provides criteria for the depollution of WEEE, although it is not a mandatory requirement in all Member States.

The criteria assumes that the Brominated Flame Retardant compliance is given at a concentration of elemental Bromine of 2000 ppm.

EN 62321-2:2021
Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjointment and mechanical sample preparation.

Possibilities/limitations XRF spectrometry in the measurement of total bromine.

EERA has focused on Waste Electrical and Electronic Equipment (WEEE) with the flame retardants of the PBDE group. This is a completely different situation than the case with HBCD, which is mainly used in Expanded Polystyrene (EPS). WEEE plastics containing HBCD are rarely observed at end-processing specialist plastics plants as it is found in packaging (e.g. when new) and so likely to be disposed of separately as the general consumer waste streams. The BFR substance group of PBBs is not found any more in plastic wastes in any detectable quantities.

The table below outlines the differences.

Criteria and properties	WEEE	EPS waste
Restricted BFRs	PBDE, less common HBCDD	HBCDD
Polymer matrices	PS, HIPS, ABS, PP and many other	PS as EPS Foams
Additives	Many different components	Very similar EPS recipes
Product forms	Solid plastic components	Foams
Manufacturing	Injection moulding and extrusion	Block foam and moulded parts
Dimensions	Wall thickness 1-5 mm	Nearly all dimensions possible
Density	About 1000 kg/m_3	15-30 kg/m_3
Standard for analytics of FR	EN 62321-6:2015	EN 62321-9:2021
Standard for sampling	EN 50625-3.1: 2014	Does not exist
Standard for sample preparation	EN 62321-2: 2021	Does not exist
Conclusion	**Very inhomogeneous**	**Homogeneous**

XRF technology cannot identify single brominated flame-retardant substances, but it can be used as a screening method to detect bromine as a representative marker, or surrogate in other words.

Total bromine is considered since mixtures of brominated flame retardants (both restricted and permitted BFR substances) can also be present, as well as other bromine sources being conceivable in other additives. Furthermore, there are many different polymers that are used in the manufacture of electrical and electronic equipment (EEE), the most important ones being PS, ABS, PP, PC-ABS etc. present a potential and varying combination of many different polymers, which may partly contain halogens.

The reality, as the SOFIES report[4] in 2020 concluded, is even more complex, considering that each category of WEEE at its end-of-life can be further mixed into different WEEE streams at collection points or on arrival at the WEEE treatment (dismantling) facilities where it is dismantled before the plastics are segregated from other fractions and are sent for further / final treatment.

This presents again the possibility for not only different combinations of polymers, but also largely different additive combinations, of which BFRs are only one additive type.

Even the type and quantities of BFRs used by manufacturers in the same WEEE categories can differ and the combination changes over time. Most of the BFRs found in most WEEE categories today are permitted substances, making the measurement of Bromine as "marker" for restricted BFR substances increasingly meaningless.

Ergo, this makes it practically impossible to use the EN 62321 Standard as reliable and validated tool for proving compliance with any UTC threshold values for PBDEs.

If lower UTC threshold values for PBDEs are applied, then the recycling industry will need to have new validated multi-laboratory test methods and proper guidance agreed before this happens, in order to be able to rely on the results as proof of compliance.

[4] Study on the impacts of brominated retardants on the recycling of WEEE-Plastics: https://tinyurl.com/myfe2pzh