

1 April 2008

Submission to the stakeholder consultation on adaptation to scientific and technical progress under Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment for the purpose of a possible amendment of the Annex

In response to the invitation to the stakeholder consultation on adaptation to scientific and technical progress under Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment for the purpose of a possible amendment of the Annex, the European Brominated Flame Retardant Industry Panel (EBFRIP) has prepared the following comments.

I. General arguments in favour of maintaining the exemption of Deca-BDE in polymeric applications

At a time when the demands on the electrical and electronic industry to respect the need to protect the environment and to ensure the fire safety of its products have never been higher, it is important that any chemical substances used in those applications are thoroughly tested. Deca-BDE has a long history of continued safe use and has been thoroughly assessed by the European regulators.

Notwithstanding any European Court of Justice ruling on the Deca-BDE exemption from the RoHS Directive, the obligation on the European Commission to “evaluate the applications for Deca-BDE (...) as a matter of priority” remains valid, in particular to resolve any contradiction between the EU science on Deca-BDE and the RoHS provisions.

The EU risk assessment under the Existing Substances Regulation 793/93 of Deca-BDE through its life-cycle has concluded that there is no significant environmental, health or consumer safety risk. On that basis there is no scientific justification for asking for an “elimination” of the use of Deca-BDE:

- In 2004, the European Union Competent Authorities closed, after 10 years of research, the scientific assessment of commercial Deca-BDE concluding no significant risk for the environment or human health and therefore no additional risk reduction measures were necessary beyond those already being applied.

- The EU risk assessment of Deca-BDE, which has been regularly updated since 2004 by the UK Rapporteur to take into account new science, has looked into over 1,100 studies on Deca-BDE.
- Meeting in Lisbon on 11 December 2007, the Competent Authorities responsible for the EU's existing chemicals policy confirmed the updated Risk Assessment Report¹ conclusions of no significant risk and no need for restrictions and agreed that the Commission should proceed to the formal publication of the Risk Assessment Report by June 2008.

Industry is working with the EU Authorities to monitor regularly Deca-BDE levels in the environment and to control Deca-BDE's industrial emissions in Europe:

- In 2004, industry committed with the relevant EU authorities, to initiate 10-year independent biomonitoring and environmental monitoring programmes. Results of these programmes are published and regularly reviewed by the EU Authorities. A voluntary programme (VECAP^{TM2}) was initiated in 2004 to apply the best practices when handling Deca-BDE both at manufacturing sites and down the supply chain. In the UK, where the process has been operational since 2004, year-on-year reductions in emission to water have been confirmed. The most recent UK textiles industry emission survey has shown a 97% estimated emissions reduction overall to water thus demonstrating the effectiveness of the VECAP process³.
- VECAPTM is developed and implemented in partnership with the Deca-BDE user industries in Europe and aims to set new standards on chemicals management in the workplace. It helps to better understand the supply chain processes and also creates awareness on substances management. As such, VECAPTM is already in compliance with REACH requests to engage downstream users in the management of chemicals. In 2008, >80% of the Deca-BDE used in the EU plastics industry is covered by VECAPTM.
- VECAPTM is currently being extended to other brominated flame retardants as well as being implemented in other world regions such as the United States, Canada and Japan.

Deca-BDE has a positive impact on consumer safety as it enables a wide variety of materials to meet high fire safety standards:

- Deca-BDE makes a tremendous contribution to society in terms of fire safety. Using Deca-BDE in the manufacture of electronic equipment prevents deaths and injuries from fires by reducing the chances of materials igniting and lowering the rate of combustion. Flame retardants are not only important in the home, but also ensure the fire safety of many public places, as well as in the automotive and aviation sectors.

¹ Update of the Risk Assessment of bis(pentabromophenyl)ether, October 2007, R013_0710_env_hh

² Voluntary Emissions Control Action Program. For more information please see: <http://www.vecap.info>

³ See 2007 VECAP Annual Progress Report: <http://www.vecap.info>

Alternatives to Deca-BDE do not have the same level of scientific data regarding their health and environmental impact:

- Alternatives to commercial Deca-BDE exist. However, even if subject to scientific evaluation, none of the alternatives has gone through a risk assessment as extensive as that for Deca-BDE. In short, there are environmental and health tests which Deca-BDE has undergone and passed but for which alternatives to Deca-BDE have not been subjected.
- Deca-BDE is a substance with no significant risk identified and is now one of the best controlled substances through the manufacturing supply chain than any other chemical used for E&E owing to its monitoring and emission control programs.
- The issue of alternatives should, from EBFRIIP's point of view, be considered the other way around: a de-selection of Deca-BDE through the RoHS directive would suppress a substance which, with certainty, poses no risk to the environment and to human health. It would also promote the use of "alternative" substances which, in the vast majority of cases, are not well tested and thus provide little or no guarantee are any better for the environment and human health.
- The REACH regulation will enable sufficient levels of environmental and health information about those potential "alternative" substances to be generated. This process could reveal that some of the alternatives pose unacceptable risks to the environment or to human health. In such a context, the European Commission could be considered as responsible for having promoted those substances by removing the initial and safe substance from the market with no sound scientific justification.

II. Detailed answers to the questions included in document 9a "Deca-BDE in polymeric applications"

- 1. Please specify the applications in detail where DecaBDE is still used. Please provide data on energy density and thermal load for each of the specific polymeric applications. Please provide information on whether DecaBDE use has increased following the elimination of the other PBDEs.**
- Deca-BDE is used in a wide range of applications in a variety of sectors such as E&E, construction, automotive, aviation, household goods, etc⁴.
 - Since the Commission's exemption of Deca-BDE in polymeric applications was justified on the positive outcome of the EU risk assessment of commercial Deca-BDE, we would like to highlight that such substitution could be beneficial in terms of environment and human health protection. Nonetheless, it should be noted that flame retardants are used depending specifically of each application's

⁴ A non-exhaustive list of Deca-BDE applications can be downloaded from the Deca-BDE section in the webpage: http://www.bsef.com/env_health/

characteristics and fire safety needs. Deca-BDE usually does not replace Penta-BDE or Octa-BDE since these substances were used in different applications than Deca-BDE is used in. Any assumption, therefore, that the volume of Deca-BDE increases automatically with the ban on other PBDEs is not correct.

2. Please state the amount of Deca-BDE used per application, the Deca-BDE content in the homogeneous material, the annual production volume as well as the number of applications related to exemption 9a put on the EU market annually.

- EBFRIIP is not in a position to provide such information as the specific applications of Deca-BDE are proprietary information of the downstream supply chain. Also, in view of existing competition law requirements, EBFRIIP is not collecting market volumes.

3. Please provide detailed information about the specific function and related performance criteria of DecaBDE. Have product groups or product parts been identified where DecaBDE use is critical? What technical characteristics do substitutes need to fulfil as a minimum requirement?

- Flame retardants, or ignition resistance materials, help prevent fires from starting and slow the rate of growth of fires that do start. As such, flame retardants allow longer escape times for those in the presence of a fire, as well as longer response times and less advanced fires for firefighters. Deca-BDE is believed to be the most effective flame retardant available in a wide range of different polymeric application as it provides the right ignition resistance characteristics without changing the polymer quality and integrity. As such, Deca-BDE is a reference to ensure compliance with existing flammability standards and the role it plays on fire safety is unquestionable. A recent cost-benefit study⁵ developed by the Swedish National Testing and Research Institute (SP) in cooperation with the Risk Assessment Institute at Utrecht University, with the aim to quantifying the gains from using flame retardants in TVs, has demonstrated that Deca-BDE used in televisions avoids 11 full house fires per million TV sets, so avoiding 160 deaths and 2,000 injuries per year across Europe. Overall, it is estimated that by using Deca-BDE, gains of between 520 and 1,100 million Euros (650 million to 1.3 billion USD) per year for the entire EU area could be achieved, mainly through saved health care costs and costs relating to damaged property.
- The assessment of the human health and environmental impacts should be a central criterion when considering “alternatives” to any flame retardant. All things being equal, the market should be free to select whatever flame retardants it wishes from those available to meet the required performance of the materials. If

⁵ “Cost benefit analysis model for fire safety – methodology and TV (DecaBDE) case study” – Margaret Simonson, Petra Andersson and Martin van den Berg, SP Swedish National Testing and Research Institute, 2006

- restrictions are to be placed on that choice then it is important they result in improved environmental or health safety rather than possibly the opposite.
- The reasons why a relatively small number of flame retardant chemicals, including Deca-BDE, represent the bulk of use in electronic products include the following:
 - Ability to obtain an acceptable and required given level of fire safety (e.g. by contributing to meet specific standards)
 - Flame retardant efficiency (lowest level of loading needed to achieve high performance)
 - specific fire safety standards)
 - Minimal impact on physical properties of polymer
 - Processability (ease of incorporation into the polymer)
 - Stability (in processing and use)
 - Resistance to external influencers
 - Approved human health and environmental profile
 - Cost effectiveness.

It should be noted that the requirements of stability in processing and use, resistance to ageing and hydrolysis and good light stability all require a flame retardant molecule to be particularly stable, and as such tends to render it less readily biodegradable.

In the case of Deca-BDE, its properties' profile makes it one of the optimum choices for use in electrical and electronic equipment applications. As regards the specific question of whether alternatives exist for Deca-BDE's use in polymeric applications, industry has recognized that these exist but that, in most cases, less is known about their environmental and human health impacts than for Deca-BDE. Feasible substitutes to Deca-BDE should therefore be as effective or more effective in terms of enabling high levels of fire safety to be achieved, be practical to formulate in all applications, and have been eligible for a positive closure on an EU risk assessment or equivalent. At this point, to our best knowledge, we do not know of any substitute flame retardant which would meet these criteria. Moreover, the use of Deca-BDE in polymeric applications presents the following advantages:

- Deca-BDE presents advantages in term of health and safety: as regards in particular to Deca-BDE safety for workers, many studies under the frame of the EU risk assessment indicate no risk A review performed by the UK Institute of Occupational Health (IOM)⁶ on the potential exposure to Deca-BDE in workers specified that *“The presence of relatively elevated concentrations of decaBDE in the blood of workers involved in recycling electronics does not imply an associated risk to health”* and that *“The risk of adverse health effects arising from these exposures is negligible and can be further reduced in the workplace by the use of standard occupational hygiene measures.”* Furthermore, a follow up study carried out on worker safety in a Swedish electronic recycling plant indicated that

⁶ UK Institute of Occupational Health (IOM) “Review of the potential human exposure to decaBDE and the associated risks to health”, 17 November 2003

- levels of Deca-BDE were decreasing following implementation of standard industrial hygiene measures⁷.
- Higher quantities of alternative flame retardants are often necessary for the same applications: In order to achieve the same level of fire protection compared to Deca-BDE, higher quantities of alternative flame retardants very often need to be used. There are practical limits how much flame retardant can be added to a polymer before it unduly affects the material's integrity and strength as at too high levels of additive the original polymer may lose its characteristics and no longer "fit for purpose".
 - There are potential consumer safety disadvantages to use alternatives: other flame retardants may not in all cases provide the same level of fire safety: Deca-BDE is the most effective flame retardant available today to prevent fire in its applications. It helps meet the highest levels of fire safety in private and public places all over Europe. The UK Environment Agency report summarised the situation: "*An extensive range of product standards, including EU, national and local regulations, has arisen in response to market pressure and litigation. These have resulted in more stringent flammability standards. Such standards can currently be met only by using flame-retardant systems based on brominated substances.*"⁸
 - Deca-BDE presents advantages in term of recycling and fire safety: the Swedish Testing Institute SP research on the life cycle analysis of a TV indicates that "*the mechanical tests clearly show that the HIPS used in this project, containing deca-BDE has improved ageing properties compared to the HIPS used in this project, without deca-BDE. In fact, the investigation indicates that unaged FR-HIPS has slightly better mechanical properties than unaged NFR-HIPS. (...) Importantly, the fire retardant behaviour of the FR-HIPS is retained after ageing. Thus, the FR-HIPS is able to pass its flame retardant properties onto a new generation of products. One can conclude, that in this investigation the HIPS containing deca-BDE is well suited to recycling with retention of important physical properties.*"⁹
 - Plastics containing Deca-BDE have superior recyclability: Certain plastics with Deca-BDE can be and are already recycled because of their comparative stability in the recycling process. Several studies including the study from GfA¹⁰ concluded that plastics containing Deca-BDE were superior to other plastics in terms of recyclability and can be recycled five times. Plastics containing Deca-BDE have also demonstrated in tests good energy recovery and are fully compatible with metal recycling¹¹.

⁷ "PBDEs in blood from Swedish workers – a follow up study in an electronic recycling industry" June 2004, Stockholm University, Lund University, ERGO, STENA. Report submitted for the conference FR 04

⁸ UK Environment Agency, 'PRIORITISATION OF FLAME RETARDANTS FOR ENVIRONMENTAL RISK ASSESSMENT', 2003, Peter Fisk Associates, page 33

⁹ "Fire-LCA Model: TV Case Study", Margaret Simonson (SP), Håkan Stripple (IVL), 2000. Extract of recycling section, page 83

¹⁰ GfA report "Analysis of a Decabromodiphenyloxide blend, a HIPS plastic, the HIPS plastic containing the DecaBDPO and Sb₂O₃ and the repeatedly recycled HIPS/Sb₂O₃/DecaBDPO plastic for partially brominated Diphenylethers and 8 polybrominated Dibenzo(p)dioxin and Dibenzofuran congeners, 1999

¹¹ "E&HS aspects on metal recovery from electronic scrap, Profit from Safe and Clean Recycling of Electronics" Boliden Mineral AB

- Finally, incineration of Deca-BDE complies with the strict dioxin/furan emission limit values: Plastics containing Deca-BDE meet the strict PBDD/F limit values of the German “Dioxin Ordinance” in the recyclate when recycling is carried out according to standard health and safety practices¹². Flame retarded materials containing Deca-BDE burn less, reducing the toxic gases production by more than 60% and reducing heat production by 75% compared to unprotected appliances. Concerns over dioxin and furan formation during incineration have been addressed by the advanced incinerator technology now available and required under EU legislation.

4. **Please provide evidence that manufacturers have put effort in research on alternatives for DecaBDE. What are the alternatives and which ones are (likely to be) used as substitutes? Are there any results about strengths and weaknesses expressed in results relating to (technical) performance criteria?**
5. **Are manufacturers still investigating alternative designs, which would allow elimination of Deca-BDE?**

- Substitutes to Deca-BDE do exist for years, but the market selected for years Deca-BDE as the best flame retardant for certain applications.
- For further information on this please refer to the European Chemicals Bureau assessment¹³ of the availability of potential alternatives to Deca-BDE as well as to the EBFRIIP’s detailed comments to this report¹⁴. As the ECB report emphasises, “*key data and information gaps in comprehensive risk assessments and hazard classification still exist*” for the vast majority of the identified potential alternatives to Deca-BDE and that “*it is not possible at this time to determine with any certainty if the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits*”.
- In considering potential “alternatives” to Deca-BDE it should be borne in mind that there are a number of applications which have to use a ‘flame active’ flame retardant to reduce the fire risk. Such applications include polymers which unzip to produce a monomer, such as polystyrene and back-coating for many styles of synthetic fabrics. The technology is such that effective ‘flame active’ performance is only provided by halogen-based flame retardants normally in combinations with antimony trioxide. Chlorinated or Brominated flame retardants are therefore the only other options which could potentially be considered as realistic substitutes for these applications. To maintain the choice of materials and the levels of fire safety that society expects it is important that suitable products are

¹² GfA report “Analysis of a Decabromodiphenyloxide blend, a HIPS plastic, the HIPS plastic containing the DecaBDPO and Sb₂O₃ and the repeatedly recycled HIPS/Sb₂O₃/DecaBDPO plastic for partially brominated

¹³ “Review on production processes of decabromodiphenyl ether (DecaBDE) used in polymeric applications in electrical and electronic equipment, and assessment of the availability of potential alternatives to Deca-BDE”, European Chemicals Bureau, January 2007

¹⁴ EBFRIIP cover note and detailed comments to ECB report on alternatives to Deca-BDE_final 15 January 2007

available which have minimal effects on the environment to avoid trading a perceived risk for a far greater to human life and the environment.

- Industry is continuously researching and developing new materials, not with the objective of eliminating Deca-BDE but rather to provide a wide range of flame retardants of choice for customers. Industry does not see any justification to references to the “elimination of Deca-BDE” given the conclusions of its scientific assessment and the lack of a similar amount of human health and environmental data supporting the use of any of the potential alternatives to the use of Deca-BDE in polymeric applications.

6. Are manufacturers still investigating alternatives for the various product groups and product parts?

- a. If yes, please provide a roadmap or similar evidence showing until when they intend to replace DecaBDE in the applications mentioned above.**
- b. If no, please explain and justify why no further research has been undertaken against the background that the RoHS Annex is subject to regular revisions.**

- Backed by the positive outcome of the EU risk assessment, our industry supports the continued manufacturing and use of Deca-BDE. As parts of our industry’s commitment to provide the E&E supply chain with new and innovative products, we are continuously involved in the research and development of new flame retardant products which, as it has been the case with Deca-BDE, will have to go through thorough testing programs as well as will have to be registered under REACH.
- The issue of alternatives should, from our point of view, be considered the other way around: when an E&E manufacturer substitutes Deca-BDE in its products, it suppresses a substance which, with certainty, poses no risk to the environment and to human health. The substitution product should be equally known and equally safe to be considered as an environmental and human health gain.

7. Assuming the current exemption will be given an expiry date, what date do you think is technologically feasible for industry?

- As stated above, the over ten-year long Deca-BDE’s EU risk assessment concluded with no need for any restrictions for Deca-BDE’s use. It was confirmed during the meeting in Lisbon on 11 December 2007, where the Competent Authorities responsible for the EU’s existing chemicals policy confirmed the updated Risk Assessment Report conclusions of no significant risk and no need for restrictions. On that basis, EBFRIIP believes that Deca-BDE exemption in polymeric applications should be maintained with no expiry date. Even further, EBFRIIP believes that the above arguments and the supporting evidence attached

to this submission provides a firm basis for excluding Deca-BDE from the scope of the RoHS Directive overall.

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