

QUESTIONNAIRE

“Study to Support the Review of Waste-related issues in Annexes IV and V of Regulation (EC) 850/2004”¹

1) Aim of the questionnaire

The following questionnaire has been prepared by BiPRO GmbH (part of Ramboll)² in close coordination with the European Commission. The questionnaire aims at gathering up-to-date information and quantitative data on Persistent Organic Pollutants (POPs) and more specifically on waste related issues of certain “new POPs”, “candidate POPs” and “already listed POPs”. The information will provide the EU Commission with the necessary scientific basis to propose amendments to the POP Regulation (EC) 850/2004 (hereafter called “POP Regulation”), due to the listing of new substances and to the review of concentration limits for substances already listed. In addition, the study shall provide guidance on how wastes containing the new POPs may be managed.

2) Background information

POPs are a group of organic compounds that possess toxic properties, persist in the environment, bioaccumulate through the food web and pose a risk to human health and the environment. POPs are transported across international boundaries far from their sources through air, water and migratory species.

The "Protocol to the regional UNECE Convention on Long-Range Transboundary Air Pollution" (CLRTAP) and the Global "Stockholm Convention" on POPs are international, legally binding instruments aiming to reduce and eliminate the production, use and releases of POPs in the territories of all participating parties. Both contain provisions on the environmentally sound management of wastes consisting of, containing or contaminated by POPs (hereafter called “POP waste”).

Although substantial progress has been achieved in limiting the use and application of POPs and reduce their emission into the environment, there are ongoing releases into the environment as well as a constant cycling of substances released in the past. For an optimised approach to elimination, all sectors in the life cycle of a product and of anthropogenic emission sources need to be considered. In this framework, proper waste management can contribute substantially to the reduction of POP releases into the environment, and a comprehensive legislation on POP waste is a necessary pre-requisite.

The Stockholm Convention was implemented into EU Community law in 2004 by the POP Regulation. It foresees an obligation to generally destroy or irreversible transform the POP content

¹ Information related to this project on behalf of the European Commission is provided on a dedicated project website at <http://pops-and-waste.bipro.de>.

² BiPRO GmbH (part of Ramboll), Munich, Germany (www.bipro.de), has been contracted by the European Commission to carry out the “Study to support the review of waste-related issues in Annexes IV and V of Regulation (EC) 850/2004”

of waste above certain concentration limits (the 'low POP content'). In addition, in exceptional cases, waste above the limits may be otherwise managed with defined operations for specified waste types if destruction or irreversible transformation do not represent the environmentally preferable option and the concentration in such wastes are below another threshold (the 'high POP content').³

In 2017, the Conference of the Parties of the Stockholm Convention (SC) decided to add three new substances to the relevant Annexes. Every time a substance is listed as a POP by the SC, the parties have to reflect the listing in domestic legislation. The EU as a party to the Convention is requested to **amend the POP Regulation by May 2018** to include these 'new POPs'.

In addition, three substances are currently under review procedures and are likely to be added to the list of POPs under the SC in the next years (the so-called "candidate POPs"). For the new POPs and the candidate POPs, there is a need to improve the knowledge basis regarding quantities that were used in the past, their concentrations and sources, as well as regarding aspects related to waste management in terms of disposal and recycling paths. This information is needed to assess possible disposal options and to establish concentration limits for waste⁴. Consequently, further analysis is needed for the following substances:

- **“new POPs”**: Decabromodiphenylether (decaBDE), short-chain chlorinated paraffins (SCCPs) and Hexachlorobutadiene (HCBD)
- **“candidate POPs”**: Dicofol, Pentadecafluorooctanoic acid (PFOA, perfluorooctanoic acid) and its salts and PFOA-related compounds, Perfluorohexanoic acid (PFHxS) and its salts and PFHxS-related compounds

Furthermore, new scientific information on three substances already listed in the annexes of the SC has raised the necessity of reviewing already established concentration limits. Therefore, the following substances require renewed analysis and, potentially adjustment of the concentration limits:

- **“already listed POPs”**: Hexabromocyclododecane (HBCD), Polychlorinated Biphenyls (PCB), Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)

4) Instructions on using the questionnaire

Please note that some of the relevant questions might have already been addressed in requests for information under the SC or the Basel Convention (BC). Submissions from EU member states related to these requests for information will be reviewed and considered as appropriate for the purpose of the actual study.

The present questionnaire is provided as an MS-Word-file and it would be much appreciated to receive your responses using this electronic version. All questions are numbered and highlighted

³ Article 7 of Regulation EC (No) 850/2004

⁴ Note that for SCCPs and HCBD concentration limits are already established in the Annexes IV and V of the POP Regulation. Only for decaBDE new concentration limits need to be established.

in grey. All fields where input is desired are blue.

The questionnaire is structured in three main sections.

- **Section I – “new POPs”:** decaBDE, SCCPs and HCBd
- **Section II – “candidate POPs”:** dicofol, PFOA and PFHxS
- **Section III – “already listed POPs”:** HBCD, PCB and PCDD/PCDF

Please only fill in the sections that you consider relevant and where you can provide specific information. Please provide specific references wherever possible and do not hesitate to also send us additional background information in form of documents, reports, data sets or as links to websites.

We recommend to quickly screen all questions of a section before starting to fill in the information. If a question is unclear or if you desire to discuss a certain aspect, please do not hesitate to contact one of the following contact persons of the project team:

Contact person	E-mail address	Telephone
Mr Alexander Potrykus	apot@ramboll.com	+49 89 978970-100
Mr Milos Milunov	mo@ramboll.com	

All information provided will be used in a transparent and traceable way for the present study. Provided that your agreement is expressed below, submitted non-confidential information will be published on the dedicated project related website⁵. If you wish to submit information on a confidential basis, please indicate this in your response. Any confidential information will only be used in anonymous or aggregated form.

Please indicate in the following table **whether you agree with the publication** of your answers to the Questionnaires:

Section		Y/N
I.I	Occurrence of “new POPs” decaBDE, SCCPs and HCBd	Y
I.II	Recycling Operations/Waste Management Options for “new POPs”	Y
I.III	Concentration Limits for decaBDE, SCCPs and HCBd	Y
II.I	Occurrence of “candidate POPs” Dicofol, PFOA and PFHxS	N
II.II	Recycling Operations/Waste Management Options for “candidate POPs”	
II.III.	Concentration Limits for dicofol, PFOA and PFHxS	

⁵ <http://pops-and-waste.bipro.de>

III Already listed POPs	
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Please return the completed questionnaire and any related documents to popwaste2018@ramboll.com before 29 March 2018.

In case you are rather interested to discuss with us by telephone, please let us know when we could reach you.

Name of Institution:	European Electronics Recyclers Association
Country:	Netherlands
City/ CIP Code:	_____
Street:	_____
Contact person:	Chris Slijkhuis – Board Member in EERA.
E-mail:	slijkhuis@mgg-recycling.com
Phone:	+43-664-357 15 22
Remark:	My remarks only refer to the recycling of WEEE plastics.

Section I – “new POPs”

Decabromodiphenylether (decaBDE); short-chain chlorinated paraffins (SCCPs); Hexachlorobutadiene (HCBD)

I. Occurrence of “new POPs” decaBDE, SCCPs and HCBD (articles in use, waste, recycled articles as well as (production) processes and unintentional releases)

1. a) Please indicate whether your country /company has *stockpiles of decaBDE, SCCPs or HCBD.*

b) If yes, please provide information on types, quantity, concentrations, etc.

a) Deca-BDE in E-Waste

b) PBDE's in remaining traces in PCR recycled content.

The EERA responses mainly refer to deca-BDE and some about HBCDD.

2. Please indicate any known *occurrence and concentration of the “new POPs” decaBDE, SCCPs and HCBD in different articles in use, waste categories and recycled articles.*

decaBDE	Specification of waste/article	Concentration [mg/kg]
Articles in use		
Wastes	E-Waste generating heat	Up to 150 000 ppm
Recycled articles	From E-Waste plastics	Traces < 1000 ppm
SCCPs	Specification of waste/article	Concentration [mg/kg]
Articles in use		
Wastes		
Recycled articles		
HCBD	Specification of waste/article	Concentration [mg/kg]
Articles in use		
Wastes		
Recycled articles		

Remarks:

3. Please provide information on quantities of waste containing “new POPs” that are currently generated, then disposed of or recycled

“new POPs”	Specification of waste	Waste generated (in kt)	Waste disposed of (in kt)	Waste recycled (in kt)
decaBDE	E-Waste plastics	1200 kMT		300 kT
SCCPs				
HCBD				

4. Please provide information on wastes containing “new POPs” that are currently recycled (now or in the near future) and on the extent of recycling. If possible, please specify the types of new articles produced from the recycled material.

“new POPs”	Types of waste recycled	Recycling rate [%]	New articles produced from recycled material
decaBDE	E-Waste plastics	60	Electronics and automotive parts and office equipment
SCCPs			
HCBD			

Remarks:

5. Please indicate up-to-date (reference) measurement (analytical) methods for identifying the presence and levels of the listed “new POPs” in waste.

There are various ways of measuring the POP BDE's, but all of them imply regular checks at accredited laboratories. These analyses methods are time consuming, complex and expensive. Therefore simplified methods are in place in the recycling standard for E-Waste recycling. If elemental Bromine > 2000 ppm, the material will have to be sent to recyclers that separate the plastics with BFRs and < 2000 ppm the plastics are considered free from POP BFRs.

6. Please indicate known inexpensive *screening methods* for identifying wastes containing “new POPs”

Measurement of elemental bromine – there are several methods such as NIR or XRF. The average percentage of POP BFR’s in the mix is known – see for instance the recent study in Switzerland.
<https://www.bafu.admin.ch/bafu/de/home/themen/chemikalien/publikationen-studien/publikationen/stoffluesse-im-schweizer-elektronikschrott.html>

7. Please indicate any known (*production*) processes using decaBDE, SCCPs and HCBd as well as options for the environmental management of their operation and potential related *unintentional releases of these POPs into the environment.*

Plastics from WEEE containing BFR’s are today all incinerated (thermal recovery or cement kilns).

II. Waste Management Options/Recycling Operations for “new POPs”

8. Waste separation for decaBDE, SCCPs and/or HCBd containing wastes:
 a) How can be **distinguished** between **contaminated and non-contaminated waste**?
 b) Which **separation operations** should preferably be used **in practice to separate** contaminated from non-contaminated waste (please provide further details if available)?
 c) What should be the preferred **waste management options for the contaminated waste fraction** (please provide justification and further details if available e.g. related costs)?

It is not possible to assume that a certain type of waste does not contain any POP, although it is known that some categories of WEEE are more likely to contain decaBDE than others. The current separation processes cannot make the distinction between the BFR substances. Many BFR substances can still be used (and it is uncertain what the hazards and risks are of the replacing substances (phosphoric flame retardants and the like).

Preferable separation operations	Relevant waste / new POP	Possible health risks for workers during separation of waste	Separation costs / ton of waste	Explanation / further information
1. Density separation	Deca-BDE	None – embedded in the matrix of the polymer		
2. NIR measurement	Deca-BDE	None – embedded in the matrix of the polymer		Not helpful for black plastics
3. XRF	Deca-BDE	Only radiation risks by XRF appliance		

Remarks:

Density separation is the widest used separation process, but it does not separate bromine material – it uses the fact that BFR containing plastics have a higher density, so the separated material will also include other heavier plastics. NIR and XRF do “recognize” bromine.

c) Preferable waste management operations	Relevant waste / new POP	Possible health risks for workers during waste management (e.g. recycling)	Management costs / ton of waste	Explanation / further information
1. Thermal recovery	Deca-BDE	none		Preferred as this counts as thermal recovery
2. Cement kilns	Deca-BDE	none		
3. Co-Incineration	Deca-BDE	none		

Remarks:

III. Concentration Limits for decaBDE, SCCPs and HCBd

9. Are you aware of any existing concentration limits for decaBDE in waste?

See Cenelec EN 50625 standard – 2000 ppm elemental bromine above which the material has to be treated in a recycling plant separating the BFR containing plastics. This is taken up in various legislations in Europe.

10. Which concentration limits for decaBDE in waste according to the POP Regulation would you recommend? Please justify.

There should not be a concentration limit of deca-BDE in waste as long as the waste is treated in recycling plants that can separate plastics with brominated content. This is perfectly in line with the EU guidance for the treatment of WEEE – see attachment. Any restricted concentration limit in waste would restrict the cross border transport of these wastes to treatment facilities capable of separating these POP containing plastics. There can be a requirement for notifications as POP containing waste.

11. At which lower concentration limits for decaBDE in waste would you expect relevant impacts (e.g. on recycling industry)? Please justify.

Any value below 1000 ppm would have 3 consequences:

1. The recycling option of WEEE and ELV plastics would cease to exist
2. The recycling targets of the EU would not be attained.
3. The investments in recycling facilities will come to a complete halt.

Recycling can separate material with BFRs efficiently, but a 100 % separation efficiency is simply impossible. Furthermore there are limitations to the practical analytic possibilities of the recycled material. This implies that any threshold below 1000 ppm in practice will result in a stop of the recycling option of these ELV and WEEE plastics.

12. Is there a *continued need for the derogation provided for POP-PBDEs in articles produced from recycled materials in the POPs Regulation (i.e. level of 1,000 mg/kg or 0.1% by weight) of POP-PBDEs allowed in articles produced partially or fully from recycled materials?*⁶ Please justify.

Of course there is. The EU wants to stimulate a circular economy, wants to stimulate recycling of plastics and wants to reduce CO2 emissions. See attachment for LCA of WEEE plastic recycling at the end of this questionnaire.

13. Is an *adjustment of existing POP limit values for SCCPs⁷ and HCBDD⁸, as specified in Annex IV and V of the EU POP Regulation, and/or additional measures required (e.g. due to any notable developments)?* Please justify.

Yes, and note that this is also the level set in the REACH restriction currently in force for decaBDE in articles. We propose to align the threshold for HBCDD to the same value of 1000 ppm.

14. Please indicate if, beyond the EU POP Regulation, there are any adjustments to EU legislation needed, resulting from the listing of the “new POPs” decaBDE, SCCPs and HCBDD under the Stockholm Convention.

There is enough legislation and related confusion related to legislative texts around brominated flame retardants as it is.

15. Can you provide any other information or information sources relevant to Section I of this questionnaire on the “new POPs”?

See attachment.

⁶ See Annex I Regulation (EC) No 850/2004

⁷ Regulation (EC) 850/2004, Annex IV, concentration limit referred to in Article 7(4)(a): 10 000 mg/kg;
Maximum concentration limits of substance listed in Annex IV: 10 000 mg/kg

⁸ Regulation (EC) 850/2004, Annex IV, concentration limit referred to in Article 7(4)(a): 100 mg/kg;
Maximum concentration limits of substance listed in Annex IV: 1000 mg/kg

Section II – “candidate POPs”

Dicofol, Pentadecafluorooctanoic acid (PFOA, perfluorooctanoic acid), its salts and PFOA-related compounds, Perfluorohexanoic acid (PFHxS), its salts and PFHxS-related compounds

I. Occurrence of “candidate POPs” Dicofol, PFOA and PFHxS (articles in use, waste, recycled articles as well as production processes and unintentional releases)

16. a) Please indicate whether your country /company has *stockpiles* of “candidate POPs” listed.

b) If *yes*, please provide information on types, quantity, concentrations, etc.

a)

b)

17. Please indicate any known *occurrence and concentration of the “candidate POPs”*, in different *articles in use, waste categories and recycled articles*.

a) Dicofol	Specification of waste/article	Concentration [mg/kg]
Articles in use		
Wastes		
Recycled articles		
b) PFOA, its salts and PFOA-related compounds	Specification of waste/article	Concentration [mg/kg]
Articles in use		
Wastes		
Recycled articles		
c) PFHxS, its salts and PFHxS-related compounds	Specification of waste/article	Concentration [mg/kg]
Articles in use		
Wastes		
Recycled articles		

Remarks:

18. Please provide information on quantities of waste containing “candidate POPs” that are currently generated, then disposed of or recycled

“candidate POPs”	Specification of waste	Waste generated (in kt)	Waste disposed of (in kt)	Waste recycled (in kt)
Dicofol				
PFOA, its salts and PFOA-related compounds				
PFHxS, its salts and PFHxS-related compounds				

19. Please provide information on wastes containing “candidate POPs” that are currently recycled (or possibly in the future) and the extent of recycling. If possible, please specify the types of new articles produced from the recycled material?

“candidate POPs”	Types of waste recycled currently (or in the future)	Recycling rate [%]	New articles produced from recycled material
Dicofol			
PFOA, its salts and PFOA-related compounds			
PFHxS, its salts and PFHxS-related compounds			

Remarks:

20. Please indicate up-to-date (reference) measurement (analytical) methods for identifying the presence and levels of the listed “candidate POPs” in waste.

21. Please indicate known inexpensive screening methods for identifying waste to be classified as POPs wastes due to their content of the listed “candidate POPs”.

22. Please indicate any known (production) processes using dicofol, PFOA and PFHxS as well as options for the environmental management of their operation and potential related unintentional releases of these POPs into the environment.

II. Waste Management Options/Recycling Operations/for “candidate POPs”

23. Waste separation for dicofol, PFOA and PFHxS containing waste:
 a) How can be **distinguished** between **contaminated and non-contaminated waste**?
 b) Which **separation operations** should preferably be used **in practice to separate** contaminated from non-contaminated waste (please provide further details if available)?
 c) What should be the preferred **waste management option for the contaminated waste fraction** (please provide justification and further details if available e.g. related costs)?

a)

b)	Preferable separation operation	Relevant waste/candidate POP	Possible health risks for workers during separation of waste	Separation costs /ton of waste	Explanation / further information
1.					
2.					
3.					

Remarks:

c)	Preferable waste management operation	Relevant waste/candidate POP	Possible health risks for workers during waste management (e.g. recycling)	Management costs / ton of waste	Explanation / further information
1.					

2.				
3.				

Remarks:

III. Concentration Limits for dicofol, PFOA and PFHxS

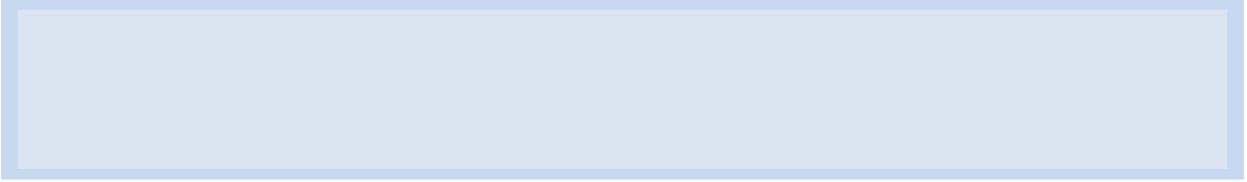
24. Are you aware of *any existing concentration limits for dicofol, PFOA and PFHxS in waste*? (please list limits individually)

25. Which *concentration limits for dicofol, PFOA and PFHxS in waste* according to the POP Regulation would you recommend? Please justify.

26. At which lower concentration limits *for dicofol, PFOA and PFHxS in waste* would you **expect relevant impacts (e.g. on recycling industry)? Please justify.**

27. Please indicate if, beyond the EU POP Regulation, there are any adjustments to EU legislation needed, resulting from the listing of the candidate POPs under the Stockholm Convention.

28. Can you provide any other information or information sources relevant to Section II of this questionnaire on the “candidate POPs”?



Section III – “already listed POPs”

Hexabromocyclododecane (HBCD), Polychlorinated Biphenyls (PCB), Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)

29. Are the existing concentration limits in Annex IV and V of the EU POP Regulation for HBCD, PCB and PCDD/F appropriate to ensure a sufficient level of environmental and health protection or is it necessary to adjust *them* (e.g. due to any notable developments such as new scientific data and technical progress, etc.)? Please justify.

The Hexabromocyclododecane (HBCDD) threshold should be aligned with the other brominated flame retardants – namely at 1000 ppm.

30. If the existing limit values need to be adjusted, which *concentration limits for HBCD, PCB and PCDD/F in waste* would you recommend and why?

See 29.

31. What would be the *major impacts from a possible adjustment of existing limit values of Annex IV or V of the EU POP Regulation*? Please justify.

It would largely simplify analyses, in that in most cases elemental bromine measurements would be sufficient in many cases.

It would hugely reduce discussions and expensive analyses for cross border traffic (notifications) for plastic wastes from durable products.

It would stimulate investors to invest in recycling facilities – with positive effects for the circular economy and on recycling targets.