Guidance on the labelling of products and articles that contain POPs

2019

Secretariat of the Basel, Rotterdam and Stockholm Conventions

Acknowledgement:

The European Union is gratefully acknowledged for providing the necessary funding that made the production of this publication possible.

The feedback from Parties and observers to the Stockholm Convention on Persistent Organic Pollutants would be highly appreciated. This publication was prepared on the bais of the draft referenced in UNEP/POPS/COP.7/16.

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Recommended citation: UNEP (2019). Guidance on the labelling of products and articles that contain POPs. Secretariat of the Basel, Rotterdam and Stockholm conventions, United Nations Environment Programme, Geneva.

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Abbreviations and acronyms

BFR	brominated flame retardant
CAS	Chemical Abstract Service
COP	Conference of the Parties
EEE	electrical and electronic equipment
EPS	expanded polystyrene
ESM	environmentally sound management
FR	flame retardant
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
HBCD	hexabromocyclododecane
ISO	International Organization for Standards
JIG	Joint Industry Guide
PBB	polybrominated biphenyls
PCBs	polychlorinated biphenyls
PCN	polychlorinated naphthalenes
PCP	pentachlorophenol and its salts and esters
PFOS	perfluorooctane sulfonic acid
PFOSF	perfluorooctane sulfonyl fluoride
POPs	persistent organic pollutants
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (EU)
RoHS	Restrictions of the use of certain hazardous substances in electrical and electronic equipment
SAICM	Strategic Approach to International Chemicals Management
WHO	World Health Organization
XRF	x-ray fluorescence
XPS	extruded polystyrene

1. Introduction

Identification of products and articles that contain POPs is a prerequisite for their environmentally sound management (ESM). Labelling products and articles has been referred to in the listing decisions of hexabromocyclododecane (HBCD) and pentachlorophenol (PCP) as recommendation to ensure that they can be identified throughout their lifecycles. The Convention does not, however, specify or suggest any particular labelling, but leaves it to the Parties. Labelling is also requested for polychlorinated biphenyls (PCBs) (Annex A, Part II, para. a (i and ii)).

Labelling products and articles that contain other POPs – like DDT, lindane, endosulfan, PCN, PFOS and PFOS-related chemicals – following manufacture as allowed by the Stockholm Convention in Annexes A and B for specific exemptions and/or acceptable purposes, would help to effectively manage the products. It might also be useful to consider labelling chemicals and mixtures containing POPs to highlight the special requirements that have been agreed regarding e.g. their waste management. Technical Guidelines for the environmentally sound management of POPs wastes developed under Basel Convention[1] note that labelling of products containing POPs may be a necessary measure in order to effectively manage the products upon becoming wastes. Labelling could also help controlling import and export of POP containing articles, and reduce the need for analyses.

The purpose of this document is to provide guidance for Parties considering labelling or other arrangements to ensure that the products and articles containing HBCD (Annex A, part VII) or PCP (Annex A, part VIII) can be easily identified throughout their life-cycle.

In addition, the document contains general considerations on benefits of labelling equipment, substances and mixtures containing POPs. Some existing classification, labelling and communication examples have been presented as examples. Challenges on communicating and preserving information on chemicals (including in POPs) in the supply chain in products and articles to protect human health and the environment has also been addressed under Strategic Approach to International Chemicals Management (SAICM) emerging issue "Chemicals in Products".[2]

Chapters 2, 3 and 4 discuss the labelling requirements that are currently in the Stockholm Convention (i.e. HBCD, PCP and PCBs). Chapter 5 contains considerations on extending labelling provisions nationally or in the listing of new POPs in the future.

2. Labelling HBCD articles

Stockholm Convention Annex A Part VII requires Parties that have registered the exemption for producing or using HBCD for expanded polystyrene (EPS) and extruded polystyrene (XPS) in buildings to take necessary measures to ensure they can be easily identified throughout life-cycle.

Part VII

Hexabromocyclododecane

Each Party that has registered for the exemption pursuant to Article 4 for the production and use of hexabromocyclododecane for expanded polystyrene and extruded polystyrene in buildings shall take necessary measures to ensure that expanded polystyrene and extruded polystyrene containing hexabromocyclododecane can be easily identified by labelling or other means throughout its life cycle.

The purpose of the requirement was to facilitate separation of non-flame retardant and flame-retardant EPS/XPS containing alternative flame retardants from that containing HBCD, as the limited use for HBCD was allowed to continue.

There are no known examples of identifying HBCD containing EPS or XPS by labelling or other means so far.

2.1 EPS and XPS articles used in buildings

EPS and XPS are very versatile materials and are found in a variety of articles. *Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with hexabromocyclododecane* (UNEP, 2015) Table 2 lists the following EPS and XPS articles that could be produced and used under the exemption pursuant to Article 4 (the list may not be exhaustive):

[1] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal

[2] http://web.unep.org/chemicalsandwaste/what-we-do/science-and-risk/chemicals-products-cip-programme

- Flame-retardant EPS insulation, including insulation boards:
    - Flat roof insulation;
    - Pitched roof insulation;
    - Floor insulation ‘slab-on-ground’ insulation Insulated concrete floor systems;
    - Interior wall insulation with gypsum board (“doublage”);
    - Exterior wall insulation or ETICS (External Insulated Composite Systems);
    - Cavity wall insulation boards;
    - Cavity wall insulation loose fill;
    - Insulated concrete forms (ICF);
    - Foundation systems and other void forming systems;
    - Load bearing foundation applications;
    - Core material for EPS used in sandwich and stressed skin panels (metal and wood fibreboard);
    - Floor heating systems;
    - Sound insulation in floating floors (to avoid transmission of contact sound);
    - EPS drainage boards.
- EPS concrete bricks, EPS concrete
- Soil stability foam (for civil engineering use);
- Seismic insulation;
- Other molded EPS articles, such as ornaments, decorations, logos, etc.
- Flame-retardant XPS insulation boards:
    - Cold bridge insulation
    - Floors
    - Basement walls and foundations
    - Inverted roofs
    - Ceilings Cavity insulation
    - Composite panels and laminates

2.2. Labelling and other options

2.2.1 Labelling, marking and branding

Ensuring identification of the articles in the list above throughout the life-cycle could take place with a label or stamp put on the board after production. Molded articles could also receive marking possibly in the mold.

Labelling or stamping the products would not be a perfect solution. First, unlike many other products and articles, EPS and XPS insulation boards and possibly other molded EPS articles may be sawed, cut, or grinded by the user when fitted into the building. The label, stamp, or other marking could be lost in the process. However, it is likely that there would be other boards in the building where the label would be visible.

Secondly, loose fill EPS is used in many applications mentioned above. Labelling individual EPS particles might not be practical.

2.2.2 Other means

Distinguishing the articles containing HBCD throughout the life-cycle by other means could take place by having the articles containing HBCD a specific colour attached to them either in the compounding, masterbatch or converting (expanding) stage, as appropriate.

EPS and XPS are, however, already on the market in many colours, especially considering the global market, and it may not be a viable option. Colour might not be explicitly interpreted either.

2.3 Conclusion

There are no known examples of countries initiating a labelling or colour scheme for production and use of HBCD under the exemption. Parties have in many cases already phased out HBCD use in favour of other alternatives.

Nevertheless, it seems marking, labelling or colouring the material in a distinct manner are feasible options to ensure identification and continuation of HBCD use under the exemption. The relatively simple supply chain for the exempted articles contributes to the feasibility. Both identified ways of marking have their shortcomings and not all marking methods may be suitable for all materials. Details that would have to figured out through negotiations with the industry include the density or abundance of labels, as well as ensuring the communication to all stakeholders about the meaning of a label until the end of the service-life of articles containing HBCD, which could be decades, or even centuries.

There are no known examples of colour coding having been used in large scale to communicate about composition of materials. However, there are examples of articles being labelled for their plastic materials or flame-retardants on the global market through voluntary or legally binding mechanisms (see below and HP, 2017).

All labelled products and articles should be managed as POPs waste according to the General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP, 2017b) and Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with hexabromocyclododecane (HBCD) (UNEP, 2015).

3. Labelling pentachlorophenol articles

The Annex A part VIII of the Convention requires parties to take necessary measures to ensure that utility poles and cross-arms containing pentachlorophenol can be easily identified by labelling or other means throughout their life cycles:

> **Part VIII**
>
> **Pentachlorophenol and its salts and esters**
>
> Each Party that has registered for the exemption pursuant to Article 4 for the production and use of pentachlorophenol for utility poles and cross-arms shall take the necessary measures to ensure that utility poles and cross-arms containing pentachlorophenol can be easily identified by labelling or other means throughout their life cycles. Articles treated with pentachlorophenol should not be reused for purposes other than those exempted.

The purpose of the requirement was to facilitate separation of utility poles and cross-arms that have been treated with pentachlorophenol under the exemption until the end of their service life. The service life of an impregnated wood utility pole has been estimated at between 30 to 90 years in North America. Actual pole service life is a function of many factors including the specification, the quality of treatment, the conditions to which the pole is exposed, and how well the pole is maintained during use. (Bolin & Smith, 2011; Canada 2014, NAWPC, 2016).

3.1 Labelling utility poles and cross-arms

The material of the utility poles and cross-arms that are treated with PCP is wood, often pine. They are typically used outside, exposed to elements throughout their service life. The wood material is also subject wear and tear. Utility poles are often already marked with tags for identification and safety information by tags or burn-branding.

Standards for utility poles exist in some countries. According to the North American Wood Pole Council[3] representing the producers of wood poles and crossarms in North America, most utility poles are typically marked during the manufacturing process in accordance with the requirements found in the American Standard ANSI O5.1 or the Canadian Standard CSA O15-15. The typical information contained on the marking includes a supplier trademark or code, the year of treatment, a code for the plant location, the species of wood, **the preservative type** and the class and length of the pole. Additional information may be included based on a utility's specifications. (www.woodpoles.org).

[3] https://woodpoles.org/Home.aspx

The information is either burn-branded on the pole or embossed on a recessed metal tag affixed to the pole. The tag is normally located at 10 feet from the butt on poles shorter than 55 feet, and at 14 feet from the butt on poles 55 feet and longer. Given the typical setting depths of poles, this normally places the information in the zone from 2 to 6 feet from the ground on an installed pole.

In New Zealand, the specifications for timber in the Standard on Chemical Preservation of Round and Sawn Timber (NZS3640) also contain requirements for marking. The country also has a national quality assurance brand for timber that conforms to the standard (Figure 1).

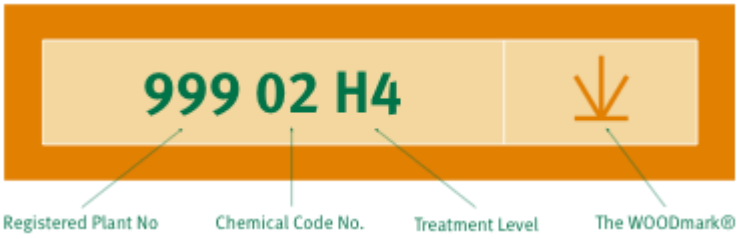

Figure 1. New Zealand's WOODmark brand information, which may appear as a label—stapled plastic tags on the end of timber—a burn brand on the end of timber or as a continuous brand along the length of the timber (http://www.nztpc.co.nz/woodmark.php).

In the European Union, manufacturers and importers of articles treated with biocides need to ensure that products are labelled according to both the regulation on Classification, Labelling and Packaging and the additional requirements defined by the Biocidal Products Regulation (EU) 528/2012[4]. The Biocidal Products Regulation (BPR) requires manufacturers and importers of treated articles to label treated articles when a claim that the treated article has biocidal properties is made. In addition, the labelling requirement could stem from the conditions of the approval of the active substance contained in the biocidal product used to treat the article. The labels need to be easily understandable and visible for consumers, but there is no requirement with regards to the articles being identified throughout their service life.

Branding or labelling materials are available by dedicated manufacturers for utility pole marking tags (see e.g. http://www.lemproductsinc.com/product-category/utility-pole-markers/ or https://nationalband.com/industrial-and-commercial-tags/utility-pole-tag-samples/).

3.2 Conclusions

Labelling, burn-branding or otherwise marking utility poles and treated timber is standard practice in many countries, and developing an appropriate marking for utility poles and cross-arms containing PCP is feasible. In countries where the existing standards require marking the wood preservative used, separating PCP treated utility poles throughout their service life may already be possible. There is no information, whether the same requirement would apply for cross-arms, but in many countries all articles treated with wood preservatives must be labelled.

The relatively simple supply chain in the production of the articles exempted in Annex A contributes to the feasibility of the labelling requirement. Labelling should be done by the manufacturer of the utility poles and cross-arms. Both the utility pole and cross-arm are likely impregnated in same preservation plants for timber, extending the requirement from utility poles to cross-arms appears feasible.

All labelled products and articles should be managed as POPs waste according to the General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP, 2017b) and Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with pentachlorophenol and its salts and esters (UNEP, 2017a).

[4] https://echa.europa.eu/regulations/biocidal-products-regulation/treated-articles

4. Labelling PCBs in equipment

The labelling requirements for PCBs are stipulated in Annex A, Part II of the Convention, which provides a management plan and inventory designed to keep track of equipment containing PCBs so that important information is not lost. Parties to the Convention are required to identify and remove from use equipment containing PCBs, as well as to attach labels indicating the presence of PCBs in appliances. The label should state the percentage in accordance with three stated concentrations, volumes and in accordance with priorities established in the Convention.

A similar requirement could in principle be considered for all POPs that are in equipment or materials and for which an inventory is made and the use of which can continue under a specific exemption or acceptable purpose (e.g. PBDEs, PFOS, SCCPs, PCN).

5. Additional considerations on developing labelling requirements for POPs

A specific label in the chemical, mixture, product or articles identifying it contains a POPs, would facilitate the control of POPs and the implementation of the Convention through the supply chain and communicate their hazards when they are marketed and traded.

5.1 Labelling products and articles containing POPs

Labelling products and articles that contain POPs – like DDT, lindane, endosulfan, HBCD, PCN, PCP, PFOS, its salts, perfluorooctane sulfonyl fluoride (PFOSF) and PFOS-related chemicals – following manufacture as allowed by the Stockholm Convention in Annexes A and B for specific exemptions and/or acceptable purposes, would help to effectively manage the products. The benefits include better control of import and export, improved possibilities for consumers to make informed choices, identification of POPs containing articles in recycling streams and waste management to ensure they are managed in an environmentally sound manner (see UNEP, 2017b).

Products and articles containing POPs for which there are no labelling requirements at present, and which still can be manufactured and used under a specific exemption or acceptable purpose, include:

- Products and articles made from recycled materials according to Part IV or Part V of the Annex A to the Stockholm Convention, containing tetra-BDE, penta-BDE, hexa-BDE or octa-BDE.
- Products and articles containing short-chain chlorinated paraffins (SCCPs), such as:
    - Transmission belts in the natural and synthetic rubber industry;
    - Spare parts of rubber conveyor belts in the mining and forestry industries;
    - Leather industry, in particular fat-liquoring in leather (according to ECB (2000), the maximum concentration in leather is 1% (10 000 mg/kg);
    - Tubes for outdoor decoration bulbs;
- Products and articles containing decabromodiphenylether (BDE-209), such as:
    - Parts for use in vehicles specified in paragraph 2 of Part IX of Annex A of the Stockholm Convention;
    - Aircraft for which type approval has been applied for before December 2018 and has been received before December 2022 and spare parts for those aircraft;
    - Textile products that require anti-flammable characteristics, excluding clothing and toys
    - Additives in plastic housings and parts used for heating home appliances, irons, fans, immersion heaters that contain or are in direct contact with electrical parts or are required to comply with fire retardancy standards, at concentrations lower than 10 per cent by weight of the part;
    - Polyurethane foam for building insulation.
- Products and articles containing perfluorooctane sulfonic acid, its salts or perfluorooctane sulfonyl fluoride, such as:
    - Electric and electronic parts for some colour printers and colour copy machines;
    - Insecticides for control of red imported fire ants and termites;
    - Carpets;

- Leather and apparel;
- Textiles and upholstery;
- Paper and packaging;
- Rubber and plastics.

These articles could also be labelled in the context of a national inventory, as is the case with PCB containing equipment (see chapter 4).

5.2 Labelling chemicals and mixtures

Identifying chemicals and mixtures containing POPs with a separate label could also be considered. Labelling requirements set out in Globally Harmonized System of Classification and Labelling of Chemicals (GHS, see Annex A for more details) cover all listed POPs. Although POPs in mixtures have to be identified on the label in countries that implement the GHS if they present in concentrations greater or equal than the cut-off value, GHS does not specifically require any reference to POPs or the Stockholm Convention. Such additional labelling could be beneficial for control of import and export as well as ensuring their environmentally sound management upon becoming waste (see UNEP, 2017b).

Mixtures containing POPs for which there are no labelling requirements at present, and which can still be manufactured and used under a specific exemption or acceptable purpose, include:

- HBCD mixtures such as (UNEP, 2015):
  - EPS beads;
  - XPS masterbatches;
- Flame-retardant mixtures containing decabromodiphenylether (BDE-209) for the production of flame-retardant plastics, textiles and polyurethane foams;
- Mixtures containing short-chain chlorinated paraffins (SCCPs), such as:
  - Additives in the production of transmission belts in the natural and synthetic rubber industry
  - Spare parts of rubber conveyor belts in the mining and forestry industries
  - Leather industry, in particular fat-liquoring in leather (up to 20% (200 000 mg/kg) EC, 2011).
  - Lubricant additives, in particular for engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration and petroleum refining to produce diesel oil
  - Waterproofing and fire-retardant paints
  - Adhesives
  - Metal processing
  - Secondary plasticizers in flexible polyvinyl chloride, except in toys and children's products
- PFOS containing mixtures, such as:
  - Aviation hydraulic fluids
  - Mist suppressants and wetting agents for metal plating;
  - Fire-fighting foam;
  - Insecticides for control of red imported fire ants and termites;
  - Mixtures for chemically driven oil production;
  - Coatings and coating additives.

5.3 Globally Harmonized System of Classification and Labelling of Chemicals

General introduction to GHS

To unify the variety of international and national classification and labelling systems, the United Nations has developed the voluntary Globally Harmonized System of Classification and Labelling of Chemicals (GHS) (now in its Seventh Revised Edition, 2017). This revised edition of the GHS has been harmonized with the United Nations

Recommendations on the Transport of Dangerous Goods – Model Regulations (UNRTDG) (in its 20th Revised Edition, 2017). The Eight Revised Edition of the GHS and the 21st Revised Edition of the Transport of Dangerous Goods Regulations will be published mid-2019. The original GHS (2003) and its revised editions in 2005, 2007, 2009, 2011, 2013, 2015, and 2017 provide guidance on the classification and hazard communication of substances and mixtures based on agreed definitions for all terms used in the system.

The GHS is an international harmonized standard for classification of chemicals and mixtures and hazard communication via labelling and safety data sheets. It is the predominant system for classification and labelling of chemicals as substances and mixtures and can be used for all POPs chemicals, but it does not cover articles.

The classification system is based on 29 hazard classes comprising physical hazards (17 classes), human health classes (10 classes), and environmental hazards (2 classes: aquatic hazards, and hazards to the ozone layer). Divisions within the hazard classes constitute hazard categories. Both classes and categories constitute what are known as building blocks.

Countries adopt the 'building block approach', described in detail in the GHS, to their implementation of the GHS according to their own chemical uses and regulatory requirements. The approach also includes standard hazard warning pictograms and "signal words" - "danger" or "warning". To assist with the classification process, the GHS provides decision logics, or decision trees, for determining hazard classes and categories. When implementing the GHS, countries have the flexibility to determine which of the building blocks will be applied in different parts of their systems – workplace, consumer products, for example. Building blocks are, for example, hazard classes like acute toxicity, carcinogenicity, and hazard categories.

Once a substance has been classified, its hazards need to be communicated to the target audience, which may include industrial workers, farmers, consumers, first-response personnel, etc. The list of elements through the label for each hazard class includes:

- Allocation of label elements.
- Reproduction of the hazard pictogram, signal word, and hazard statement.
- Precautionary statements and pictograms.
- Product supplier information, International Union of Pure and Applied Chemistry (IUPAC) name, and Chemical Abstract Service (CAS) registry number.
- Multiple hazards and precedence of information, supplied as appropriate along with any special labelling elements.

Although implementation of the GHS is voluntary, it is increasingly being adopted for workplace substances, including pesticides, and less so for consumer chemicals (although some jurisdictions, such as the EU and New Zealand have legislated for its use for consumer chemicals).

The World Health Organization (WHO) has been updating the Recommended Classification of Pesticides by Hazard in Accordance with GHS Criteria. The 2009 edition of The WHO Recommended Classification of Pesticides by Hazard[5] aligns the classification of pesticides to that of the GHS, especially the GHS classification for acute oral toxicity. When implementing the GHS for pesticides, Parties can take this WHO classification into account.

In many countries the GHS is implemented by legislation. Most countries that have not yet done so are determined to implement the GHS for hazardous chemicals in the future as it is the basis for sound chemicals management; however, they may lack the resources to do so. For example, the United Nations Institute for Training and Research/International Labour Organization (UNITAR/ILO) is supporting national GHS implementation and capacity-building projects in various countries.[6]

[5] http://www.who.int/ipcs/publications/pesticides_hazard/en/
[6] http://www.unitar.org/cwm/ghs

6. Conclusions

Many chemicals, mixtures, products and articles containing POP are still produced, placed on the market, used, imported and exported. Labelling or marking them would increase the flow of information on the POPs content in the supply chain and ensure the end customer would know to dispose of the articles properly at the end of their service life. Labelling would help in enforcement of restrictions on import, export and placing on the market.

Requirement on marking that would last in the article through the service life has been agreed on remaining uses of HBCD and PCP in the Convention. Fortunately, both of these articles have supply-chains that are relatively simple. Nevertheless, there are no known examples on labelling EPS and XPS used in buildings for this purpose, likely at least partially because many parties have already phased in alternatives. Utility poles and cross-arms made of treated timber, on the other hand, needed to be marked for other purposes in many countries already before the listing in the Stockholm Convention, including with the information on the wood preservative. Marking or branding in utility poles is a tool for the utility companies to keep track on the quality of their utility poles and to avoid poles failing in service. Relatively little additional arrangements would be required to meet the labelling requirement set out in Annex A for PCP.

Extending labelling requirements to other POPs and other articles would benefit their management and flow of information in chemicals in products in the supply chain. There are examples of existing systems for labelling articles by their content (ISO 1034-4) or assuring the absence of certain chemicals (the EU RoHS2). However, supply chains of some of those articles may be more complicated than that of EPS, XPS, utility poles and cross-arms. Ensuring the flow of information about the label may therefore be more challenging in e.g. machines that are made of many components. Some articles could also be labelled in the context of a national inventory, like is currently done with PCBs.

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) should ensure the POPs are mentioned in the labels of mixtures when exceeding the set cut-off values.

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