



turn back the toxic tide

80 Yesler Way, Ste. 300  
Seattle, Washington 98104  
Telephone: 206.652.5555  
e-Mail: [inform@ban.org](mailto:inform@ban.org)  
Web: [www.ban.org](http://www.ban.org)

## **The Issue of Plastics Additives and their Consideration in the New Plastic Waste Listings (COP14) including within the Sections on Cured Resins and Fluorinated Polymers**

Basel Action Network

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### **Introduction**

In response to Decision BC-14/13, BAN submits the following information on the new Plastic Waste Listings of Y48, B3011 and A3210. We base our examination of the new listings on our knowledge of the composition of Plastic Waste and in particular the implications of the prolific use of additive compounds in the plastic industry. It is our conclusion that a fair examination of this issue will mean that many of the waste streams currently characterized as non-hazardous will either be hazardous in fact, or containing contaminants and other wastes to the point of ensuring their entry on Annex II. This fact is true not only for cured resins and fluorinated polymers, but for single polymers and mixed polymers.

In this submission, BAN will not investigate each listing of single polymers, cured resins or fluorinated polymers, to determine their appropriate designations, but will rather highlight some of the overarching considerations which must now govern how we view these new listings in light of the additive constituents found in plastic wastes. At this time we will leave the examination of the listed cured resins and polymers to our colleagues at GAIA, IPEN, CIEL etc.

### **Annex VIII and IX and their Relation to Annex II**

Annex VIII (presumed hazardous) and IX (presumed non-hazardous) were adopted in 1997 in order to assert presumptive hazardous waste controls (or not) on known traded waste streams. They are derived from the Annexes of I and III and can always have their presumptions rebutted by the use of those two parent Annexes.

Annex II historically came about earlier due to the fact that during the negotiations of the original Convention some waste descriptions were identified which some countries believed

were hazardous and needed to be controlled, while a minority did not wish to call them hazardous. Thus, a new listing of "Wastes Requiring Special Consideration" was created to avoid defining these as "hazardous" wastes while recognizing their problematic nature. These Annex II wastes are also referred to as "other wastes" in the Convention as defined in Article 1.2.

Annex II waste cannot be considered at Basel level to be hazardous, nor are they designated as non-hazardous. But they are subject to all of the same controls under the Convention as hazardous waste. The only exception to this rule of thumb being that the Ban Amendment (Article 4a) does not include these "other wastes" within the scope of its ban. Some Parties such as the EU countries have however, added Annex II to their implementation of the Basel Ban Amendment.

Clearly, the most important new entry in the package of new plastic waste listing amendments found in Decision 14/12 is the entirely new Annex II entry Y48. It is a catch-all listing which covers all plastics not thought to be hazardous (Annex VIII, listing A3210) or non-hazardous (Annex IX, listing B3011).

Thus, there are now three categories of plastic waste (Annex II, Annex VIII and Annex IX). As However, what is not as clear is how the Parties are to interpret the new listings and in particular Annex II.

As plastic waste relates to Annexes VIII, one needs to assure that a basis exists in Annexes I and III. For that purpose, we can refer to the listing Y13 in Annex I -- *wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives*. That one category seems to cover all one could expect to be defined as plastic waste and more, due to the fact that resins are the source of plastic polymers. And with respect to Annex III we can expect that certain plastics will be considered H4.1, flammable; H11, toxic; H12, ecotoxic; and H13, caable by any means after disposal, of yielding another hazard.

Annex IX plastic wastes are defined by the new listing B3011 unless they can be shown to contain an Annex I constituent and an Annex III characteristic at the same time (see Annex IX chapeau).

Annex II does not normally rely on Annexes I and III but in the case of Y48, it does in a way as it includes everything not considered hazardous or non-hazardous based on Annexes I and III. If we assume all hazardous plastic waste is consists of the Y13 listed waste stream then the following table represents the ways in which Basel controls plastic waste.

<b>Universe of Plastic Waste and Basel Controls</b>	
1. Plastic Wastes found in Y13 possessing a hazardous Annex III characteristic. (A3210)	Annex VIII
2. Plastic Wastes as listed in B3011 unless found to be in (1) above	Annex IX
3. All other plastic wastes not in (1) or (2) above	Annex II

## **Y48**

Y48 is not defined directly but rather indirectly by being the inverse of its three bulleted exceptions (hazardous plastic waste, and non-hazardous plastic wastes, and another exception for one particular mixture of plastic waste).

The 2nd bulleted exception is further defined in three sub-categories -- the first being a non-exhaustive list of single polymers, followed by a non-exhaustive list of cured resins, and then an exhaustive list of five different fluorinated polymers. While the call for information from the Parties found in Decision 14/13 paragraph 35 listed only the latter two subparts (cured resins and fluorinated polymers), the entire entry is in fact interrelated in terms of issues for consideration.

### **The Three Exceptions to Y48 -- Are these Appropriate?**

The first bulleted exception makes sense since wastes clearly defined as being hazardous under the terms of Article 1.1.a of the Convention should be listed on Annex VIII, not Annex II. These wastes will be subject to the normal control procedures for hazardous wastes and will, unlike Annex II wastes, trigger the Basel Ban found now as Article 4a.

The second bulleted exception likewise makes sense in terms of realizing the need to not control plastic waste that is not deemed as hazardous or otherwise problematic.

The third bulleted exception on the other hand, needs to be examined with great care with respect to whether those listings -- laid out in 3 subcategories and replicating the Annex IX listing, really define wastes which should not be better considered Annex VIII or Annex II wastes (Y48).

There are three areas of concern under which these need to be scrutinized:

1. Are these wastes carefully described so that we know what we are talking about?
2. Are these wastes actually hazardous in some or all instances (A3210)?
3. Are they extremely difficult to recycle and therefore unlikely to be recycled and thus deserve being listed under Wastes Requiring Special Consideration (Y48).

### **Non-Exhaustive Lists Means Parties Do Not Know What They Are Excepting**

It is troubling and unprecedented among Basel listings that the first two subcategories -- single polymers and cured resins are not listed exhaustively. The terms in the decision "including but not limited to" means that we do not know how long the exceptions list is now what it actually could contain. From a legal and scientific standpoint, it is not appropriate for create an open-ended list as an exemption to important regulations. Such an open-ended list means that any unlisted polymer, including ones that may not even exist yet but will be produced in future, are deemed to be non-hazardous or non-problematic simply because they are non-halogenated and destined for R3 recycling destination. Likewise, with cured resins. But how can we be assured that unknown materials are non-hazardous or capable of being properly recycled by an R3 process? Nothing can be more un-precautionary nor unscientific than creating exemptions for something we do not know. These lists must therefore be closed. If Parties wish to add new polymers to the list they can do so by making a case for each of them on an individual basis. This is how it works for all other listings.

### **The Hidden Danger of Additives**

Until now, the Basel Parties have not considered the serious matter of plastics additives. Yet the Basel Convention is based on the science of assessing actual potential harm of traded waste streams. The names of what a substance or object is referred to is not as important as what it actually contains in its totality and the hazard those ingredients are likely to cause.

In practice, pure polymers almost never exist as post-consumer plastic waste. They are always mixed with additives of varying, and sometimes unknown toxicity or hazardousness. Or they can consist of materials that make environmentally sound recycling difficult to impossible. Additives can be hazardous outright or can present synergistic action with other chemicals that are of unknown effect or found to be hazardous in combination. Some additives are Stockholm listed POPs, while others are unlisted or as yet to be listed POPs. Many consist of toxic heavy metals, some of which are listed on Annex I.

Further, additives normally found in plastic are not usually found in just *de minimis* (insignificant) amounts. They are most often found in amounts measured in whole percentage figures and not in parts per thousand or million. For example, the percentages of additives such as plasticizers are as high as 70%.

Thus, it is clear, that unlike other listings in the Basel Annexes, the Basel plastic waste listings that only list polymers and therefore suggest that that is all that they consist of, are in fact misleading and inaccurate. Yet in order to regulate trade based on hazardousness as we do in the Basel Convention our regulations must be based on environmental science. It is clearly unscientific to simply list PVC or Polyethylene when we know that this does not describe what is being dealt with and in fact could even be a minority of what is being managed due to the high content of unnamed additives.

For these reasons, it is essential that any environmental regulation of plastic waste consider these hidden additives. To date this has not been done. So far, the Convention has not provided any useful guidance with respect to how to identify and address plastic additives.

In the Appendix, the table shows the categories of additives and the approximate amounts found in different types of plastics.

### **How Basel Should Deal with Additives Found in Plastic Wastes**

Properly addressing additives will inevitably mean that some of the polymers and cured resins currently on Annex IX will need to be moved to Annex VIII upon close scrutiny or if the hazard is less well defined, then at least they will be caught by the Y48 Annex II catch-all (wastes requiring special consideration). But how can we know which ones in practice?

If we always knew which additives were in which polymers by sight or labelling, it would be easier. But this is not the case. And it is also not the case that we can know what additives are used based on the polymer used. With post-production waste it is possible to have the material labelled as to what additives it contains, but for post-consumer plastic this is not likely ever to be possible. We know that it is impractical to conduct a gas-chromatograph, mass-spectrometry test on each and every bit of plastic prior to trade and management to determine its proper characterization and Basel listing.

Yet, we also know that a central obligation of the Basel Convention is that *"each Party should take appropriate measures to require that information about a proposed transboundary movement of hazardous wastes and other wastes be provided to the States concerned, according to Annex V A, to state clearly the effects of the proposed movement on human health and the environment."* (Article 4.2.f)

And, in the absence of this information, it is clear that Parties will therefore *"have reason to believe that the management will not be environmentally sound"* and thus would need to prevent their export (Article 4.2.g).

If the waste in question being exported is not properly described in terms of hazardous materials in the documentation then the traffic is illegal and criminal according to the Convention (Article 9.1.d, Article 4.3).

### **New Plastics Listings Y48, A3210 and B3011**

The new listings of controlled and uncontrolled plastic wastes adopted at COP14 only obliquely refer to additives. But they do in fact refer to them.

An A3210 designation is required if any of the constituents (i.e. additives) such as lead compounds exhibit a hazardous characteristic. Many of the polymers found on B3011 could well trigger this designation given the additives found in the chart found in the Appendix.

If the above is not found to be the case, then a Y48 designation is likely. This will be based on the language found in the B3011 exemption (non-hazardous). That language reads:

*"Plastic waste listed below, provided it is destined for recycling in an environmentally sound manner and almost free from contamination and other types of wastes"...and "Plastic waste almost exclusively consisting of one non-halogenated polymer'...'cured resin'...or 'fluorinated polymer". [emphasis added].*

The language underlined above describes what elsewhere is often referred to as "de minimis" or *insignificant* levels. If higher than "de minimis" levels of "non-polymer", "non-cured resin", "non-fluorinated polymer additives are found in plastics, then these plastics cannot be considered as material that is "almost exclusively consisting of..." or almost free from contamination...". Further, as a Y48 determination does not require the threshold of existing on Annex I while possessing an Annex III characteristic, any plastic waste containing additives at higher than de minimis levels (excepting the obvious hazardous ones) should be designated as Y48.

Of the B3011 listings then, only those that have no significant amounts of additives can be considered as properly placed. We suspect that this will in fact be a very small percentage of the total volumes of plastic waste.

Thus, with a new lens on additives we can see our new table of the universe of plastic waste as looking like this:

<b>Universe of Plastic Waste and Basel Controls</b>		
1. Plastic Wastes found in Y13 possessing a hazardous an Annex III characteristic. (A3210)	Annex VIII	Including those containing significant amounts of hazardous additives.
2. Plastic Wastes as listed in B3011	Annex IX	Not including wastes containing significant amounts of additives of any kind
3. All other plastic wastes (not in 1 or 2 above) (Y48)	Annex II	Including wastes containing significant amounts of non-hazardous additives of any kind.

With respect to the categories above, with the question of additives considered, we can expect Annex II to contain most of the universe of Plastic Wastes (e.g. 75%), Annex VIII the next highest (e.g. 20%) and Annex IX (e.g. 5%).

### **Who is Responsible?**

But whose responsibility is it to ensure that the proper application of the Basel Convention based on the additives is prescribed? Is the burden of proof on the exporter? We think a clear reading of the Convention says it must be. Article 6 lays out the responsibility of the generator or exporter to properly notify the export. And certainly, the Convention makes it clear that the burden cannot be placed on the importing or transit state (Article 4.10).

### **Recommendations for Parties**

**1. Consider the implication of de minimis levels --** We must recognize that the language used in the COP14 Decision, including "...almost free from contamination and other types of wastes"...and "almost exclusively consisting of..." is not "predominantly consisting of" or "with the recycling target polymer being". The language rather is the language of defining a "de minimis" amount -- or in other words, an exceedingly small amount that is insignificant in effect. Such language ensure that additives are indeed "other types of waste" and/or "contamination". Such language, contrary to what some might conclude from the footnote regarding "specifications", does not warrant the use of commercial specifications created by waste trade associations.

**2. All listings that are Open-ended must be closed --** It is without scientific basis to include waste streams on Annex IX that are unknown and therefore cannot be assessed for hazardous characteristics or problematic nature.

**3. Address plastic additives --** All post-consumer plastic and most plastic waste contain significant quantities of chemical additives, which can render waste toxic, mixed and contaminated, or difficult to recycle. One therefore cannot be complacent with the literal polymer or resin listing, but compliance with the Convention requires knowing what is really being traded in terms of the unnamed chemical composition of the plastic waste. If the toxicity is established including for these additives, then such plastic wastes needs to be considered as being in Annex VIII. If the additives exist at below de minimis levels then the waste should be considered as Annex IX. All other plastic waste should be considered as mixed and contaminated and be considered as Annex II.

**4. Practical regulation --** In the absence of knowledge of additives, levels of contamination, and hazardousness we recommend at the level of customs, compliance and enforcement, that the default category of Annex II be applied. In that way the control procedure of prior informed consent will be applied to ensure that countries have transparency and the right of refusal of import/export/transit.

**5. Annex II should become part of national implementation of Basel Ban Amendment --** With respect to export and transit to and through non-Annex VII countries, we urge countries to include Annex II in their implementation of the Ban Amendment as the EU has prudently done.

**END**

## APPENDIX -- Plastic Additives

Category/Type of additive	Typical amount range % w/w	Substances	Additional comments/explanations
Plasticisers	10-70	Short, medium and long chain chlorinated paraffins (SCCP/MCCP/LCCP); Diisooheptylphthalate (DIHP); DHNUP; Benzyl butyl phthalate (BBP); Bis (2-ethylhexyl)phthalate (DEHP); Bis(2-methoxyethyl) phthalate (DMEP); Dibutyl phthalate (DBP); dipentyl phthalate (DPP), di-(2-ethylhexyl) adipate (DEHA), di-octyladipate (DOA), diethyl phthalates (DEP), diisobutylphthalate (DiBP); Tris(2-chloroethyl)phosphate (TCEP); dicyclohexyl phthalate (DCHP), butyl benzyl phthalate (BBP), diheptyl adipate (DHA), heptyl adipate (HAD), and heptyl octyl adipate (HOA).	About 80% is used in PVC while the remaining 20% in cellulose plastic.
Flame retardants	3-25 (for brominated)  0.7-3	Short, medium, long chain chlorinated paraffins (SCCP/MCCP/LCCP); Boric acid; Brominated flame retardants with antimony (Sb) as synergist (e.g. Polybrominated diphenyl ethers (PBDEs); Decabromodiphenylethane; tetrabromobisphenol A (TBBPA));  Phosphorous flame retardant (e.g. Tris(2-chloroethyl)phosphate (TCEP) Tris(2-chlorisopropyl)phosphate (TCPP)). hexabromocyclohexane (HBCDD)	Three groups:  • organic non-reactive (e.g. phosphate esters, halogenated phosphate esters, halogenated hydrocarbons)  • inorganic nonreactive (e.g. antimony oxide, aluminum oxide trihydrate, zinc borate, ammonium orthophosphate, ammonium sulfamate)  • reactive (e.g. bromine and/or phosphorus containing polyols, halogenated phenols, tetrachlorophthalic anhydride, phosphonate esters, dibromoneopentyl alcohol)
Stabilisers, Antioxidants and stabilizers	0.05-3	Bisphenol A (BPA); Cadmium and Lead compounds; Nonylphenol compounds; Octylphenol; 1,3,5-	The amount depends on the chemical structure of the additive and of the

		Tris(oxiran-2-ylmethyl)- 1,3,5-triazinane-2,4,6-trione (TGIC)/1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)- trione ( _TGIC), Butylated hydroxytoluene (BHT), 2- and 3-t-butyl-4 hydroxyanisole (BHA), tetrakis(methylene-(3,5-di-t-butyl-4-hydroxyhydrocinnamate) methane (Irganox 1010), and bisphenolics such as Cyanox 2246 and 425, Tris-nonyl-phenyl phosphate (TNPP), tris (2,4-di-tert-butylphenyl) phosphite, (Irgafos 168).	plastic polymer. Phenolic antioxidants are used in low amounts and phosphites in high. Lowest amounts in polyolefins (LLDPE, HDPE), higher in HIPS and ABS.
Heat stabilizers	0.5-3	Cadmium and Lead compounds; nonylphenol (barium and calcium salts). Mainly used in PVC. Based on Pb, Sn, Ba, Cd and Zn compounds. Pb is the most efficient and it is used in lower amounts.	
Slip Agents	0.1-3	Fatty acid amides (primary erucamide and oleamide), fatty acid esters, metallic stearates (for example zinc stearate), and waxes	The amounts are dependent on the chemical structure of the slip agent and the plastic polymer type.
Lubricants (internal and external)	0.1-3		
Anti-statics	0.1-1		Most types are hydrophilic with the potential to migrate to water.
Curing agents	0.1-2	4,4 - Diaminodiphenylmethane (MDA); 2,2 -dichloro-4,4 -methylenedianiline (MOCA); Formaldehyde – reaction products with aniline; Hydrazine; 1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione (TGIC)/1,3,5-tris (2S and 2R)	Peroxides and other crosslinkers, catalysts, accelerators.
Blowing agents	Depends on the density of the foam and the potential gas production of the agent		Azodicarbonamide, benzene disulphonyl hydrazide (BSH), pentane, CO2
Biocides	.001-1	Arsenic compounds; Organic tin compounds; triclosan.	Soft PVC and foamed polyurethanes are the major consumers of

			biocides. They vary in chemical structures and include chlorinated nitrogensulphur heterocycles and compounds based on Sn, Hg, As, Cu and Sb, e.g. tributyltin and 10,10 - oxybisphenoarsine.
Colorants, soluble (e.g. azocolorants)	0.25-5		Migrate easily and are used in highly transparent plastics. They are expensive, with limited light and heat resistance. Mostly used in PS, PMMA and cellulose plastics to give a bright transparent color.
Organic pigments	0.001-2.5	Cobalt (II) diacetate.	Insoluble with low migration.
Inorganic Pigments	0.01-10	Cadmium compounds; Chromium compounds; Lead compounds	E.g. zinc sulphide, zinc oxide, iron oxide, cadmium-manganese based, chromium based, ultramarine and titanium dioxide.
Special Effect	Varies with the effect and substance in question		Al and Cu powder, lead carbonate or bismuthoxichloride and substances with fluorescence. Substances with fluorescence might migrate, the former not.
Fillers	up to 50	Calcium carbonate, talk, clay, zinc oxide, glimmer, metal powder, wood powder, asbestos, barium sulphate, glass microspheres, silicious earth.	
Reinforcements	15-30	Glass fibers, carbon fibers, aramide fibers, 15-30 is for glass only due to its high density.	

Source: E. Hansen, N. Nillson, D. Lithner, C. Lassen, Hazardous Substances in Plastic Materials, COWI in cooperation with Danish Technological Institute, 2013.