Treatment of brominated flame retardants under the Basel Convention
Outline

- Purpose – outline developments in the POPs area
- BFRs are listed in multilateral international agreements that NZ is a party to so implications for NZ operators
- Previously used in some plastics - Not all plastics are equal
- EPA have the permitting role that implements these agreements
EPA Role Import and Exports
(Restrictions) Prohibition Order (No 2)

- Regulatory role – to ensure that exports and imports of hazardous waste comply with international obligations

- Permits for export when:
  - Prior informed consent from qualifying destinations
  - NZ does not have capacity, or material is raw material for importing country, or in accordance with Basel criteria
  - ESM in importing country
  - Export otherwise in conformity with Basel Convention
  - If waste contains Stockholm chemical – trade must be in accordance with Article 6(1)(d) of Stockholm Convention
Plastics with BFRs

Plastics with flame retardants
  With brominated flame retardants - BFR
  With poly-bromodiphenyl ethers - BDEs
  With Stockholm BDEs

Polybrominated diphenyl ethers

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The Conventions

- **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes**
  - Prior informed consent before trade, requirement for ESM
  - Lists – categories of wastes, hazardous constituents, hazardous characteristics

- **Stockholm Convention on Persistent Organic Pollutants** is a global treaty to protect human health and the environment from POPs
  - Elimination/severe restriction on listed POPs - eg Chlordane, DDT, polychlorinated biphenyls (PCB), dioxins
  - Lists – Recently added some BDEs, proposals to list more
Basel Convention

E-waste can be a hazardous waste in Annex VIII

- A1180 Waste electrical and electronic assemblies or scrap containing hazardous components (List A - Annex VIII) or with material or contaminants to an extent that they are hazardous.

E-waste can also be non-hazardous waste under Annex IX

- B1110 Electrical and electronic assemblies:
  - Electronic assemblies consisting only of metals or alloys.
  - Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing hazardous components (list A) and not contaminated to the extent they are hazardous.
  - Electrical and electronic assemblies destined for direct reuse, and not for recycling or final disposal.
Basel Convention

Equipment will often contain hazardous components examples of which are indicated in the entry A1180 of Annex VIII:

- lead-containing glass from cathode ray tubes
- nickel-cadmium batteries and batteries containing mercury
- selenium drums
- printed circuit boards that contain brominated compounds and antimony oxides as flame retardants, lead in solder as well as beryllium in copper alloy connectors (Y45)
- fluorescent tubes and backlight lamps from LCDs which contain mercury
- plastic components containing Brominated Flame Retardants (BFRs) 50 mg/kg or more (Also Y45)

“E-waste should therefore be presumed to be hazardous waste unless it can be shown that it does not contain such components” – (From draft Basel e-waste guidance)
The Stockholm BDEs

Stockholm Convention on Persistent Organic Pollutants - treaty to protect human health and the environment from persistent chemicals

Older POPs include pesticides and other chemicals – eg Chlordane, DDT, polychlorinated biphenyls (PCB), dioxins

2010 – 9 new POPs including some BDE:

- HexaBDE & HeptaBDE (commercial octabromodiphenyl ether)
  - additive flame retardant in polymers for electrical and electronic equipment and transport uses.

- TetraBDE & PentaBDE (commercial pentabromodiphenyl ether)
  - additive flame retardants – US for the treatment of polyurethane foams – mattresses and furniture. Other applications include electrical equipment, building materials, polyurethane foam
POPs-PBDE

- Highly persistent in the environment, bioaccumulative
- High potential for long-range environmental transport
- Detected in humans and biota in all regions – still at low levels
- There is evidence of its potential for toxic effects in humans, and wildlife
- Risk of dioxins and furans formation on combustion
- Stockholm BDEs being phased out - c-OctaBDE in 2004
- Alternatives available
- Flow of polymers containing POP-BDE/BFR for recycling are not well controlled
Stockholm concern

Levels of PBDE in human milk from the third WHO human milk survey
BDEs in New Zealand
Technical Guidelines

Technical Guidelines for the Identification and Environmentally Sound Management of Plastic Wastes and for their Disposal 2002

Need for sorting

Plastics containing BDE should be excluded from material recycling. Treated in feedstock recycling facilities or in controlled incinerators recovering energy.

PACE – INF 6 from OEWG 2012

Need for knowledge to disassemble e-waste as to parts that may contain harmful substances (e.g., mercury, PCBs and plastics containing BFRs) in manual disassembly and the associated treatment and disposal. (Para 5.1.8)

Plastics may be recycled if they are separated by type and are mostly free of metals and other contaminants

Must also be free of certain hazardous BFRs, unless they can be removed or can legally continue to be used as flame retardants.

Plastics can be used in smelting operations as fuel and as reducing agents, if smelter emissions are well controlled, especially for dioxins and furans. (Para 5.1.13)
Guidelines

- Draft Basel e-waste guideline – 2012 – includes brominated flame retardants

“Equipment will often contain hazardous components examples of which are indicated in the entry A1180 of Annex VIII. E-waste should therefore be presumed to be hazardous waste unless it can be shown that it does not contain such components and in particular... plastic components containing Brominated Flame Retardants (BFRs), in particular BFR that are persistent organic pollutants according to the Stockholm Convention that can be assigned to Annex VIII entry A3180…”

- Requirement for export permit and ESM
  - Exporter declaration/application
  - EPA decides permit
  - Enforcement
Identification and sorting

- Identification & Sorting
  - X-ray fluorescence (manual XRF)
  - X-ray transmission (XRT)
  - Knowledge and polymer labeling
  - Density (sink and float)

- Identification
  - Plastic for applications where presence of heat
  - CRT housing
  - Age of item
Conclusions

Plastic containing BDE are hazardous wastes – if in doubt sort and treat as though they are hazardous.

Basel permit when exported

Plastics containing the Stockholm POPs can be exported subject to a Basel permit but the plastic should be treated so the POPs are destroyed.

“Plastics may be recycled if they are separated by type and are mostly free of metals and other contaminants; they must also be free of certain hazardous brominated flame retardants, unless they can be removed or can legally continue to be used as flame retardants. Plastics can be used in smelting operations as fuel and as reducing agents, if smelter emissions are well controlled, especially for dioxins and furans.” PACE (Para 5.1.13)"

http://www.epa.govt.nz/hazardous-substances/import-export/Pages/default.aspx