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Investigation of brominated flame retardants present in articles being used, recycled and disposed of in New Zealand

A technical report prepared for the Ministry for the Environment, Wellington

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August 2010

The Project Consortium for this report

Partner detail	Project tasks
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Polymers Centre of Excellence University of Auckland, Tamaki Campus Dr. Len Harvey (Director) Building 740, 125 Morrin Road Glenn Innes, Auckland, New Zealand 09 373-7599 ext 82527	Provide information on: Polymers Relationship polymer – BFR Manufacturers in New Zealand
Nimmo Bell & Company Limited Mr. Nick Giera, M.Com.Agr. (Partner) Level 2, 3-11 Hunter Street Wellington, ph 04 472-4629 507 Eastbourne Street West Hastings, ph 06 876-2057	Estimate quantity of BFR in New Zealand Interrogate data bases of NZ Statistics and NZ Customs Estimate BFR's in waste, recycling and disposal Built spreadsheet model and carried out risk assessment on accuracy of data
Verschueren Environmental Consultancy B.V. Ir. Karel Verschueren (Director) Oude Baan 36 Rosmalen The Netherlands Ph 0031 73 523-6006	Compile environmental data of BFR's Provide data of overseas BFR studies Liaise with laboratory on extraction of BFR's

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Executive Summary

An estimate has been made of products containing brominated flame retardants imported, in-use, exported and disposed of in New Zealand. The methodology adopted for this study has demonstrated that an inventory approach is feasible should this be required. The current study should be seen as a first approach and the volumes estimated for BDEs in consumer products is likely to be an underestimate given the scale of investigation required to identify all potential BDE containing products and analysis of BDE content per sample. That level of investigation is beyond the scope of this study. The scope of this study excluded commercial and industrial goods and did not include the full range of consumer product categories.

The analysis shows that at least 12 tonne of BDE is currently being imported in finished consumer goods annually, 280 tonne is contained in articles "In-Use" and 60 tonne is being deposited in landfills annually. All three volumes are likely to be decreasing. Risk analysis using QuRA™ indicates that the range of the current estimate of "In-Use" BDE is from 163 to 440 tonnes. Using the approach outlined in the report, there is an estimated 740 tonne of BDE in articles currently deposited in landfills. Using stated assumptions on the rate of disposal to landfills and article usable lifetime, it is estimated that total deposited tonnes will reach 1,200 tonnes within 10 years, although the rate is slowing with a reduced level of prevalence in both imported and New Zealand made goods.

Further work would be required to:

- Undertake a more comprehensive survey of New Zealand manufacturers to understand historical levels of BDE use in domestic and export products;
- Undertake a more comprehensive review of customs data using the proposed method to analyse BDE prevalence demonstrated in this study;

There are very few articles containing commercial pentaBDE and octaBDE that are recycled in New Zealand. The majority of recycled polymer articles are in the packaging and food-contact categories such as milk and soft drink bottles (recycle classes 1 and 2), and these are not expected to contain BDEs. The only significant area of local recycling involving BDE-plastics is believed to be polystyrene foam, for which it would be preferable that the uses of the recycled material be limited to 'closed' applications such as use in concrete foundations.

Disposal to landfill is in the New Zealand situation a well developed and controlled activity. Only very low levels of BDEs were present in the leachate of three landfills tested. This study supports disposal of BDE-plastics to secure landfills as an environmentally sound means to dispose of BDEs containing polymers / plastics. Compared to the quantities of these products stored, the quantity of BDEs leaving the landfill in leachate is infinitesimal. These initial findings should be more widely validated.

1 Introduction

1.1 Background

The Ministry for the Environment requires investigation and reporting on the prevalence of brominated diphenyl ether (BDEs) flame retardants in manufactured articles and in recycled and waste materials. The purpose of this work is to help the Ministry assess whether it is feasible and practicable to meet Article 6 obligations under the Stockholm Convention on Persistent Organic Pollutants.

BDEs (commercial penta and octaBDEs) are now listed as persistent organic pollutants under the Stockholm Convention. This designation may impact on how New Zealand manages BDE containing wastes depending on how the 'environmentally sound management' of these wastes is defined.

BDEs are used as flame retardants in a range of consumer products. Two key products or product components are foams (furniture, including vehicle seats etc) and hard plastics used in consumer electrical and electronic equipment (such as computers). While a proportion of BDE-containing articles may be recycled in New Zealand (including exporting for recycling) it is expected that most BDE-containing material in circulation in New Zealand are eventually disposed of to landfill.

1.2 Ministry for the Environment context for this project

The purpose of this work is to help the New Zealand Ministry for the Environment assess whether it is feasible and practicable to meet Article 6 obligations under the Stockholm Convention on Persistent Organic Pollutants in respect of the disposal of BDE-containing wastes. This study reports on the use, recycling and disposal to landfill of articles containing BDE flame retardants.

Expected Outcome: By utilising the information in the report, the Ministry will be enabled to: (i) report to the Secretariat of the Stockholm Convention on Persistent Organic Pollutants, the data compiled on the use, recycling and disposal to landfill of articles containing BDE flame retardants as requested of Parties by the Secretariat; and (ii) evaluate the implications of Article 6 of the Stockholm Convention in respect of waste disposal requirements for articles containing BDEs. Such an evaluation is needed before New Zealand could accept BDEs under the Stockholm Convention.

The work contributes to achieving Ministry's overarching objectives: (i) to minimise environmental hazards posed by hazardous substances (that need to be managed and disposed of in ways that protect the environment and the health and safety of people);and (ii) by working through relevant international environmental organisations to meet New Zealand's international reporting obligations.

The outputs from the work (the deliverables) will be: (i) A completed *Questionnaire for submission of information on New POPs* (in respect of BDEs) to the extent possible; and (ii) a report "Investigating brominated flame retardants" that addresses the objectives itemised below.

1.3 Project Objectives

The objectives of the project are:

1. to complete the *Questionnaire for submission of information on New POPs* (in respect of BDEs, presented in Appendix J) to enable New Zealand to respond to the Secretariat of the Stockholm Convention on Persistent Organic Pollutants, AND,
2. to provide a report to the Ministry with the following information, estimates and assessments:
    i. The types and quantities of articles in New Zealand containing BDEs, including concentrations of those substances in the articles;
    ii. The fate of these BDE-containing articles once they are discarded as wastes, including the proportion and/or approximate quantities disposed to landfill or recycled (including export); evidence of the presence of BDE in leachate;
    iii. The types of articles being recycled, the nature and extent of this recycling (including export), and the types of articles and/or reusable materials produced from recycling;
    iv. The available options for environmentally sound disposal of articles containing BDEs within New Zealand; including any requirement for leachate control;
    v. An assessment of the most practical and cost effective methods for routinely identifying the presence and levels of BDEs in waste articles and materials (e.g. in support of waste collection and disposal activities);
    vi. An opinion of whether it is feasible and practical for New Zealand to meet Article 6 obligations under the Stockholm Convention on Persistent Organic Pollutants.

1.4 Project Perspective

Brominated Diphenyl Ethers (BDEs) are a subgroup of bromine-containing flame retardant compounds, which in turn are a segment of all flame retardant compounds. The pie chart below shows the European consumption of flame retardants in 2007. The BDEs form a segment of the 'red pie' the total group of brominated flame retardants (BFR).
It is interesting to note that the chloro-paraffins (Cl-Paraffins) amounting to 7% of the FR consumption are being considered for the addition to the Stockholm Convention.

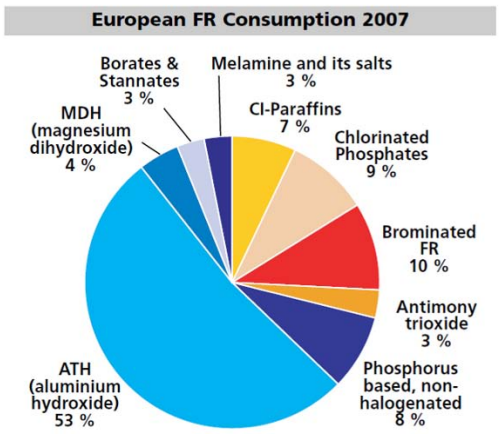
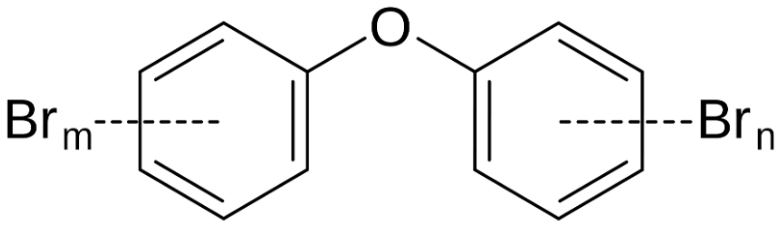


Figure 1: The consumption of flame retardants in Europe, which amount to a total of 498,000 tons

Ref. **EFRA** European Flame Retardants

The flame retardancy of polybrominated diphenyl ethers (PBDEs) increases with the number of bromine atoms in the molecule. Therefore only the higher brominated BDEs like Penta, Octa or Deca are of commercial interest. The general chemical formula of polybrominated diphenyl ethers is:



PBDEs have many congeners depending on the number and position of the bromine atoms on the two phenyl rings. The total possible number of congeners is 209, and the number of isomers for mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, octa-, nona- and deca BDE are: 3, 12, 24, 42, 46, 42, 24, 3 and 1, respectively. Structural details along with relevant physical data of some of the more common BDEs as well as some of the present day, more frequently used brominated flame retardants are discussed in Appendix B.

2 Estimate of the amount of BDE in New Zealand

2.1 Purpose

The purpose of this section of the study is to provide an estimate of the quantities of BDE in New Zealand by reviewing potential sources, the end use of BDE-containing articles and the disposal of these articles in New Zealand to the extent possible given the limited scope of the study. A preliminary quantitative assessment of the following potential sources of BDE are given:

- the types and quantities of articles in New Zealand containing BDEs, including concentrations of those substances in the articles;
- the fate of these BDE-containing articles once they are discarded as wastes, including the proportion and/or approximate quantities disposed to landfill or recycled (including export);
- the types of articles being recycled, the nature and extent of this recycling (including export), and the types of articles and/or reusable materials produced from recycling.

2.2 Method

This assessment of BDE in New Zealand was undertaken through industry participant interviews and by researching quantitative information from the following sources:

- New Zealand based literature assessing management of polymers and contaminants;
- International literature on the management of BDEs in manufacturing, waste and recycling;
- Statistical analysis of trade flows of raw materials and industrial and consumer goods that contain BDEs from government statistics;
- Semi structured interviews with major manufacturers that currently use or have used BDEs in their manufacturing processes;
- Analysis of the BDE content of sampled consumer goods to estimate total BDE volumes; and
- Plastics New Zealand polymer Mass Balance Survey data.

A review of literature and interviews with industry participants identified the most likely uses of BDE in consumer goods for various BDEs. The major retail stores were identified and approached for testing. The analysis of BDE content in finished consumer goods required sample testing in retail stores. The retail stores were selected based on the products they stocked, their likely market share and willingness to participate in the sampling exercise.

The major goal in testing the products was to identify quickly and non-destructively which articles contain polybrominated diphenyl ethers (PBDEs). This was achieved using an X-ray fluorescence (XRF) analyser. The XRF analyser is discussed in more detail in appendix C but in short it reveals quickly the concentration of bromine within a sample in part per million (ppm). Over a four day period from 5 April to 8 April 2010 seven major retail stores were investigated with the XRF analyser and a total of over 800 analyses were carried out on a wide variety of consumer products.

It has been necessary to make a number of assumptions in developing the estimate of PBDE flows in New Zealand. These have been made due to limitations to the scope and time available to research the required data. All assumptions are stated in the report alongside key data tables and are based on sample analysis, interviews with industry experts and literature.

Further details on the methods used for each of the sources of information are contained in the relevant sections of the report with the study findings.
Recommendations are made on the key data gaps and a proposed methodology to overcome the current study's limitations.

2.3 Results of research into the types and quantities of articles containing BDEs

The estimate of BDE contained in various articles in New Zealand has been quantified into three categories: imported articles to New Zealand; exported articles; and existing articles currently in use. Four key potential sources of BDE have been targeted in the analysis:

- Plastics New Zealand mass balance survey on end use of polymers imported as virgin resin and reel stock;
- National trade statistics on imports of finished consumer goods;
- Estimated BDE content of finished consumer goods based on laboratory and XRF data;
- Interviews with industry participants on likely increase proportion of imported goods containing BDEs.

2.3.1 BDE contained in existing products

To assess the quantities of BDEs in existing articles, an assessment of historical quantities used in manufacturing and quantities likely to be contained in imported articles has been undertaken. The following types of organisations were contacted to gather information on the current use of BDEs as a flame retardant in New Zealand manufactured plastic products (for both domestic use and export). Key people contacted were category managers, technicians and managers of small companies involved in niche roles in the supply chain (e.g., importers and plastic recycling companies). The following types of organisations were contacted:

- Furniture retailer
- Foam fabricator/cutter
- Foam manufacturer
- Furniture importers and manufacturers
- Soft furnishings manufacturers and retailers
- Importers of plastic manufacturing inputs
- Plastics New Zealand
- Plastic recycling companies and industry organisations

In order to gather quantitative information on current and historical volumes of BDEs used in New Zealand the team prepared and mailed an industry survey questionnaire (see Appendix D) through Plastics New Zealand. There was a very low response to this questionnaire and the only quantitative information gathered was done so through telephone interviews to targeted manufacturers (those viewed as having a major share of their respective markets). This assessment has provided an indication of trends in use and some limited information on quantities. However, it is recommended that future studies include in-depth analysis using an industry endorsed survey to develop a more comprehensive assessment of quantities currently and historically used in New Zealand.

The results of industry interviews indicate that, while EU and North America regulatory authorities have led an international response to the threat of the presence of BDEs (in commercial and consumer products) has to human health; New Zealand is likely to have a significantly lower level of BDE in existing, imported and exported products than those regions. This is due to the historical absence of regulations requiring household goods to contain flame retardants in New Zealand manufactured goods. Anecdotal evidence suggests that this type of regulation was a major driver for the increased prevalence of BDE (as an effective flame retardant) in EU countries and the UK, and was introduced in the late 1980s.

The discussions gained from industry interviews suggests that the main source of PBDE in existing products has come from finished consumer products imported within the last decade (mainly from developing countries), from polymer resin used in the manufacture of New Zealand products and in chemical compound form for production of polymer products for specific applications. These include drapes, furnishings and furniture in hospital, schools, cinemas and other public places that require a higher flame retardancy rating than consumer products do.

Another source of information used to identify potential articles that contain BDE and an indication of the percentage in each article was to undertake physical samples of consumer articles currently in-use using the XRF method (see Section 2.3.2 and Appendix E for details on the method used). The team expected to find the presence of BDE in a range of furniture (in foam and upholstery), furnishings and floor coverings of 10 – 30 years in age. The relative absence of PBDE (i.e., readings under 0.1% bromine) in most samples (over 85%) of finished consumer goods is an unexpected finding and is likely to be due to the absence of legislation in New Zealand for the compulsory use of flame retardants in consumer goods. The low levels of BDE in current imports are likely due to the phasing out of BDEs under international agreements on the use of hazardous substances.

While the use of BDE is still permitted in New Zealand, major foam manufacturing companies limit the use of any form of flame retardant to “specific applications”. A major importer of polymers for the furniture and furnishings industry only uses flame retardants for specific uses such as schools, hospitals, cinemas and marine as is required by legislation (drapes, furnishings, and foam in chairs). For example, a specific application (less than 5 percent of the market) may use an imported chemical such as Firemaster550 (27% Bromine) and is mixed at a rate of 2 percent in the final product. In this example 1 tonne of FireMaster550 is used and over 85 percent of the foam product is exported leaving 150kg of FireMaster550 in 7,500 tonnes of foam (at 2 percent content) entering the New Zealand market annually. Industry interviews indicate that prior to 2006 larger quantities of BDE were used.

Interviews with major New Zealand based flooring manufacturers also indicate that historical usage was around 15 tonnes per year of D60F (containing PBDE) from 2000 - 2005 and prior to that 8.0 tonnes from 1990 - 2000. The data table in Appendix A contains a summary of imported volumes (tonnes) of plastic resins from all countries from 1988 to 2009[1]. This data was used to estimate the

[1] Statistics New Zealand harmonised trade data records on the StatsNZ website go back as far as 1988.

volume of potentially BDE containing products that are manufactured in New Zealand. The polymer resins included in the analysis is based on the Plastics New Zealand Mass Balance Survey (a statistical analysis of imported volumes of polymer resins and their uses in New Zealand) and is shown in Appendix A. An estimate of the amount of BDE containing products manufactured from imported plastics resins in New Zealand using BDEs is based on the Mass Balance Survey end use profile and estimates of the percentage of BDE contained in finished products. Assumptions on the percentage of BDE in finished products are based on the results of the finished goods analysis and data sheet information provided by manufacturers interviewed. The assumptions used for % of BDE in finished products are shown in the table below.

Table 1 Assumptions on percentage of BDE in New Zealand manufactured products

Uncertain variables	% BDE in finished products
% BDE in PP products made in New Zealand	0.12%
% BDE in EPS products made in New Zealand	1.47%
% BDE in PVC products made in New Zealand	0.01%
% BDE in LDPE products made in New Zealand	0.15%
% BDE in OTHER products made in New Zealand	1.68%

Using this approach the estimate of BDE used in New Zealand manufacturing is likely to be around 15 tonnes of BDE imported and used in New Zealand manufactured products annually, although most of these products are exported (i.e. over 80 percent). We estimate that the range of this value is from 5-30 tonnes and is based on the quantitative analysis outlined above and also shown in Section 5 (Profile of BDE flows in New Zealand). This estimate is also supported by information gathered through interviews with plastic manufacturers suggesting that the estimate is a "reasonable estimate".

The profile of BDE in New Zealand articles is derived from trade statistics (See Appendix A) and this also suggests that the volume of BDE in existing articles is likely to be between 250 and 350 tonnes. We have estimated a most likely value of 280 tonnes. Given that many articles containing BDE are electrical equipment with a typical lifetime of less than 10 years, this volume is decreasing and is estimated to have peaked between 2000 and 2005 at 400 – 450 tonnes. As BDE containing articles reach their usable lifetime, BDE is moving from "in-use" category and into landfills which is increasing. The quantified flow of BDEs in New Zealand is described in Appendix A.

2.3.2 BDE contained in imported products

The main source of BDE in imported products is from finished consumer products and as a flame retardant used by polymer manufacturers of some plastic products and industrial applications (for example, cable coverings and circuit boards). Our investigations of polymer manufacturing companies and literature review indicates that the number of products containing BDE retardants will decline over time as countries sign up to international frameworks that limit their use in manufacturing and require the use of alternatives (e.g., metal based or phosphate flame retardants).

Our survey of literature and interviews with industry participants indicate that flooring underlay manufactured in New Zealand do not contain flame retardants and only a small amount of imported product is likely to have them. Testing of samples in various retail stores has confirmed this finding.

The information in the box below summarises findings from a brief review of international literature to assess the international environment for the use of BDE in plastics manufacturing as a reference point to gauge estimates of quantities in New Zealand.

EU Standards

In the EU a directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC Restriction of Hazardous Substances Directive or RoHS) was adopted in February 2003. The RoHS directive took effect on 1 July 2006, and is required to be enforced by law in each member state. This directive restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment including BDEs. It is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC which sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of toxic e-waste.

Under the EU directive the maximum permitted concentrations of PBDE and PBB are 0.1% or 1000 ppm by weight of homogeneous material meaning the weight of the computer monitor backing or the polymer sheath covering electrical cables. Reviews of the RoHS have been undertaken since 2004, such as the review of two excluded product categories (monitoring and control equipment, and medical devices) for future inclusion in the products that must fall into RoHS compliance. The RoHS directive applies to:

1. Large and small household appliances
2. IT equipment.
3. Telecommunications equipment (although infrastructure equipment is exempt in some countries)
4. Consumer equipment.
5. Lighting equipment—including light bulbs.
6. Electronic and electrical tools.
7. Toys, leisure, and sports equipment.
8. Medical devices (currently exempt)
9. Monitoring and control instruments (currently exempt)
10. Automatic dispensers.

While BDE containing flame retardants are still used in some products (as our sample analysis has shown), the need for new alternatives is being driven by policy, standards, and pressure from environmental groups. Europe banned the use of pentaBDE and octaBDE, in 2004, the same year they were withdrawn from the North American market. DecaBDE had been granted a five year phasing out period from 2006 but this RoHS exemption was withdrawn on 1 April 2008 by the European Court of Justice decision and the phasing out of Deca-BDE was due to begin in July 2008. In the US, in 2007 some states including Washington and Maine have banned deca-BDE in some products (furniture) and some will phase them out in TVs and electronics beginning in 2010. In 2009, there was an announcement that the two US producers of Deca-BDE will voluntarily phase out decaBDE in the US by 31 December 2012[2].

[2] http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/deccadbe.html

Standards in other regions

China, from where a large volume of electronic and household consumer equipment used in New Zealand originates, has its own RoHS (known as Chain RoHS) and has stated its intent to establish restrictions in specific categories. Unlike EU RoHS, where products in specified categories are included unless specifically excluded, there will be a list of included products, known as the *catalogue* although there is no timeline for this yet. Japan does not have any direct legislation dealing with the RoHS substances, but its recycling laws have spurred Japanese manufacturers to move to a lead-free process in accordance with RoHS guidelines. South Korea promulgated the *Act for Resource Recycling of Electrical and Electronic Equipment and Vehicles* on April 2, 2007. This regulation has aspects of RoHS, WEEE, and ELV.
Leading manufactures and electronic product developers are also introducing environmental product standard to global brands. For example, IBM requires suppliers to comply with their environmental standard "Baseline Environmental Requirements for Materials, Parts and Products for IBM Logo Hardware Products". In this IBM bans DecaBDE. Similarly, there is Hewlett-Packard's environmental standard: General Specification for the Environment (GSE).

Despite some concerns about product quality impacts and reduced reliability, since July 2006 millions of European RoHS compliant products have been produced worldwide. Most consumer electronics manufactured in North America, Europe and Japan now comply with the European RoHS directive, examples include Apple's iPod portable music players, Dell and HP home computers and servers, Nintendo's Wii, Motorola and Nokia's wireless phones, Netgear routers, and Panasonic televisions and appliances. Further companies and their commitments to phase out PBDEs are provided in Table 2 below.
In Australia, Deca-BDE has been declared by the Australian Ministry for Health and Ageing as one of the "Priority Existing Chemicals (PECs)" and as a consequence a study into the potential effects on human health and the environment are to be undertaken by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS).

halogen specification	PVC		Br, Cl and their compounds	
OEM	specification	timeline	specification	timeline
Nokia	not intentionally added		Br < 900 ppm, Cl < 900 ppm	all products by 2008
Sony-Ericsson	banned	exclusion by end of 2006	Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm	all new products by end of 2006
Lenovo	banned (> 25 g part)	new product from 2009		all products from 2009
Dell	not intentionally added (> 25g part)		Br < 900 ppm, Cl < 900 ppm	all products from 2009
LG	< 100 ppm	begin phase out in 2008; exclusion from all products 2010	Br < 900 ppm, total halogen < 1500 ppm	all products from 2010
Sony	banned (FFC and package)			
Samsung	banned (package)			all mobile phone products from 2010
Toshiba	not intentionally added	begin phase out 2009		begin 2009
Wistron			Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm	begin 2008 3Q
Apple	not intentionally added (> 25 g part)		Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm	all products by the end of 2008
HP	Cl < 900 ppm	all new computing products from 2009	Br < 900 ppm	all new computing products from 2009
Intel	1000 ppm (reporting threshold only)		not intentionally added	

Table 2 Halogen free timelines for various electronic manufactures

Source: Innovative Flame Retardants in E&E Applications[3]

In 1999, a comprehensive analysis carried out by the Electronic Industries Association of Japan estimated that about 3% of global printed circuit board manufacturers had switched to using halogen-free materials. However, it expected this to increase rapidly to 80% by 2010 (Plastics New Zealand, 2006).

The limited life-time of this consumable electronic equipment (less than five years) means that in New Zealand these products are likely to move relatively quickly from "in-use" and into our waste and recycling system.

Trade import data above was used with the analysis of weight and percentage of BDE in the over 800 samples taken of imported consumers goods. Table 3 below shows assumptions used for the %BDE in imported goods based on the analysed samples of imported goods. The correlation factor of 0.5 was determined in an attempt to correlate the laboratory analysis (of a selection of plastics) with the XRF analyser data obtained when testing the consumer products. A more detailed explanation is provided in the following section (section 2.3.3) and Appendix F.

[3] http://www.pinfa.eu/uploads/Documents/pinfa_HFFR_Brochure_2009_web.pdf

Table 3 Values used to estimate percentage BDE in imported consumer goods

Summarised Sample Analysis			
	Imported Consumer Goods	XRF %BDE	XRF/Analysis Corr (0.5)
1	Auto interior	0.069%	0.034%
2	Auto parts	0.012%	0.006%
3	Beds/bedding	0.014%	0.007%
4	Building materials	0.020%	0.010%
5	Bulb holder	1.674%	0.837%
6	Carpet/flooring	0.007%	0.004%
7	CD player	0.786%	0.393%
8	Clothes	0.004%	0.002%
9	Computer Equipment	0.887%	0.444%
10	Dishwasher	0.684%	0.342%
11	Electrical other	0.045%	0.023%
12	Electrical plugs	0.317%	0.159%
13	Fan heater	5.502%	2.751%
14	Fridge/Freezer	0.084%	0.042%
15	Floor insulation	0.376%	0.188%
16	Furniture other	0.023%	0.012%
17	Hair dryer	3.813%	1.907%
18	Irons/ironing boards	0.001%	0.000%
19	Kettles	0.298%	0.149%
20	Laptop transformer	0.362%	0.181%
21	Lighting equip	1.377%	0.689%
22	Miscellaneous	0.001%	0.000%
23	Oil heater	0.986%	0.493%
24	Other home appliances	0.002%	0.001%
25	Other kitchen appliances	0.006%	0.003%
26	Oven/grills	0.092%	0.046%
27	Power board	9.698%	4.849%
28	Power tools	0.026%	0.013%
29	PS refil	0.228%	0.114%
30	Sofa	0.058%	0.029%
31	Soft furnishings	0.010%	0.005%
32	Stereo	0.862%	0.431%
33	Switches	0.148%	0.074%
34	Thermic heater	5.408%	2.704%
35	Toaster	0.024%	0.012%
36	Toys	0.007%	0.003%
37	TV	5.155%	2.578%

Given the uncertainty in forecasting future imported volumes, particularly as the volumes (mass of BDEs) being imported have decreased significantly over the past five years and the limited time series available for statistical analysis, a statistical analysis of future volumes is not included here. However in section 4 we do present an uncertainty analysis of current data.

Other assumptions used in estimating the total volume of BDE in imported finished goods include an allowance for a variance in the percentage of BDE in imported goods over three periods. Table 4 below shows that estimates of percentage BDE contained in finished products is likely to be higher for the decade prior to 2004 (as a year in which international pressure emerged to reduce the use of BDEs) and lower prior to 1994.

Table 4 Assumptions to reflect international trends in BDE use

Variance period	% of 2010 values
Pre 1994	80%
1994 - 2003	120%
Post 2004	100%

An example imported product is shown below; hair-dressing apparatus; electro-thermal hair dryers-Customs Code 516310001 to illustrate how the assumptions for weight of product, percentage BDE, likely percentage of imports containing BDE and expected lifetime of the imported product are used with the trade import data. These assumptions are also used to develop the profile of BDE in New Zealand in Section 5.

Example product: Hair-dressing apparatus; electro-thermic hair dryers (Customs Code 8516310001)

	Kg per unit	% BDE	% of Imports	Life-time	Landfilled	Recycled
Pre 1994 (7)	0.500	1.525%	80.0%	5.00	100.0%	0.0%
1994 - 2003 (7-16)	0.400	2.288%	80.0%	5.00	100.0%	0.0%
Post 2004 (17)	0.380	1.907%	80.0%	4.00	95.0%	5.0%

Table 5 below contains a summary of the likely imported volumes of BDE from a range of imported articles manufactured in overseas countries using the approach and assumptions outlined above. A more detailed breakdown of estimated quantities is contained in Appendix A and is based on the quantification of total imports of 219 customs codes from the period 1988 – 2009. Given the international trend to phase out the use of BDE as a flame retardant, imported volumes from finished articles are likely to be in the range of 5 – 25 tonnes per year for the next five years with further reductions thereafter.

Table 5 Estimated volume of BDE in imported finished goods

	BDE contained in finished goods (tonnes)
	Electronic equipment, appliances and electrical goods, furniture, household and commercial goods
1988	4
1989	6
1990	7
1991	8
1992	9
1993	9
1994	17
1995	18
1996	19
1997	21
1998	19
1999	18
2000	18
2001	18
2002	23
2003	27
2004	27
2005	30
2006	28
2007	18
2008	16
2009	12

To obtain an indication of the number of products that contain brominated compounds a survey of consumer products was carried out. The results of this survey are set out in Appendix M.

2.3.3 Methods used to analyse the presence of BDE in imported consumer products

XRF analysers have the ability to detect total bromine including the various oxidation states of bromine and also in organic compounds such as brominated flame retardants and long chain polymers. This provides a simple, cost effective and non destructive manner to show the presence of bromine in various consumer products.
The XRF technique relies on the fluorescence of elements in the X-ray spectrum. The area analysed is only a few square millimetres and the item is not damaged. The analysis reveals the concentration of bromine in the product in ppm in a short time period (20 seconds). While the presence of bromine can be easily established with the use of a XRF analyser it can also quantify the total amount of bromine in the sample once the analyser has been calibrated. The calibration has been carried out using internationally certified standards of 98 and 808 ppm Br (Appendix D). These standards were constantly used throughout the investigation to ensure the reliability and validity of the analysis carried out.
New Zealand's leading electrical and retail outlets were approached and their consent was sought to analyse the goods of interest in their stores and over a 4 day period well over 800 analyses were carried out on a variety of the consumer products. Details on the types of products that were selected are described in Appendix E. The product details were noted whenever a positive bromine result was obtained so that the quantities of each of these products imported or manufactured per year could easily be obtained from NZ Statistics database.

Due to the destructive nature, the cost and the relatively large quantity (10-30g) required for laboratory analysis, testing of all the consumer products that were identified by the XRF as potentially containing BDEs was not possible. Consequently it was decided to use the XRF's bromine results to generate an approximate quantity of the total BDE that were likely present in the consumer products. This was achieved by using the laboratory analysis (in mg/kg) that identifies 20 of the most significant polyBDEs and then calculating this into a 'total bromine content' for each plastic sample. A correlation factor was then calculated that related the total bromine found from the laboratory analysis to the value obtained by the XRF analyser.

Details of the step by step conversion from the laboratory analysis to a total bromine content value based on molecular weight and the subsequent determination of the 'laboratory analysis to XRF correlation factor' are given in Appendix F. A summary is given below in Figure 2.

As is shown in Figure 2 the correlation factor was found to be 0.5. In other words only half of the bromine value obtained by the XRF was actually detected as BDE's by laboratory analysis. The laboratory has reported an extraction efficiency of > 90 %. Consequently in order to estimate the BDE content it was necessary to multiply the averaged XRF bromine value for a particular consumer product by 0.5.

A summary of the average %BDE present in the consumer goods was given in Table 3. Evidence of brominated compounds was found in many of the products that were expected to contain BFR the only exception being flooring materials. The full list of substances analysed and the results obtained can be found in Appendix M.

The location of the bromine containing polymers varies on the type of product investigated but in most cases the BFR was found to be located where there is a potential for considerable generation

of heat or close to an electrical contact within the appliance. A notable exception was that of a dishwasher where the external panels all contained bromine presumably a BFR at >3 %. It was interesting to note that the appliances that typically generate the most heat had the largest proportion of BFRs namely, TVs, hair-dyers, convection heaters, and irons. This does not mean however that all products of this type contained a BFR.

	mg/kg product	TV back	PCB	Toyota camfry seat foam	Toyota Corolla hood lining	EPS Car Seat	EPS Floor insuln	Sofa fabric	Electric switch	Bulb energy saver	Electric plug	Electric power board	Printer Cartridge	Thermal fax cover	Mazda seat	Fan heater	Cd player
lims nr.	Type of BDE & Congener	10/0410	10/0411	10/0412	10/0413	10/0414	10/0415	10/0416	10/0417	10/0418	10/0419	10/0420	10/0421	10/0422	10/0423	10/0424	10/0425
sample code		BFR-1	BFR-2	BFR-3	BFR-4	BFR-5	BFR-6	BFR-7	BFR-8	BFR-9	BFR-10	BFR-11	BFR-12	BFR-13	BFR-14	BFR-15	BFR-16
BDE28	triBDE 2,4,4'	<16	0.01	<0.001	<0.1	<0.6	<0.4	<0.001	<0.2	<6.7	<0.2	<19	<6.5	<0.001	0.8	<0.003	<1.1
BDE49	tetraBDE 2,2',4,5'-	<16	<0.002	0.003	<0.1	<0.6	<0.4	<0.002	<0.2	<6.7	<0.2	<19	<6.5	<0.002	4.4	<0.004	<1.1
BDE71	tetraBDE 2,3',4',6-	<16	<0.002	<0.001	<0.1	<0.6	<0.4	<0.001	<0.2	<6.7	<0.2	<19	<6.5	<0.001	<0.2	<0.003	<1.1
BDE47	tetraBDE 2,2',4,4'-	<16	<0.14	14	0.6	<0.6	<0.4	<0.1	<0.2	<6.7	<0.2	<19	<6.5	<0.1	317	<0.3	<1.1
BDE66	tetraBDE 2,3',4,4'-	<16	<0.02	<0.01	<0.1	<0.6	<0.4	<0.01	<0.2	<6.7	<0.2	<19	<6.5	<0.01	3.0	<0.03	<1.1
BDE77	tetraBDE 3,3',4,4' -	<180	<0.002	<0.001	<1.3	<7.2	<4.0	<0.001	<2.4	<76	<2.4	<210	<73	<0.001	<2.3	<0.003	<13
BDE100	pentaBDE 2,2',4,4',6-	<86	<0.07	0.8	<0.6	<3.4	<1.9	<0.06	<1.2	<36	<1.2	<101	<35	<0.05	179	<0.1	<6.1
BDE119	pentaBDE 2,3',4,4',6-	<86	<0.008	<0.006	<0.6	<3.4	<1.9	<0.006	<1.2	<36	<01.2	<101	<35	<0.006	<1.1	<0.02	<6.1
BDE99	pentaBDE 2,2',4,4',5-	<86	<0.4	5.5	0.6	<3.4	<1.9	<0.3	<1.2	<36	<1.2	<101	<35	<0.3	1007	<0.8	<6.1
BDE85	pentaBDE 2,2',3,4,4'-	<86	0.003	<0.006	<0.6	<3.4	<1.9	<0.006	<1.2	<36	<1.2	<101	<35	<0.006	52	<0.02	<6.1
BDE126	pentaBDE 3,3',4,4',5'-	<16	<0.001	0.01	<0.1	<0.6	<0.4	<0.001	<0.2	<6.7	<0.2	<19	<6.5	<0.001	<0.2	<0.003	<1.1
BDE154+BB153	hexaBDE 2,2',4,4',5,6'-	<32	<0.05	0.3	<0.2	<1.3	<0.7	<0.04	<0.4	<13	<0.4	<37	<13	<0.04	115	<0.09	<2.2
BDE153	hexaBDE 2,2',4,4',5,5'-	<32	<0.07	0.3	<0.2	<1.3	<0.7	<0.05	<0.4	<13	<0.4	<37	<13	<0.05	135	<0.1	<2.2
BDE138	hexaBDE 2,2',3,4,4',5'-	<32	<0.009	<0.007	<0.2	<1.3	<0.7	<0.007	<0.4	<13	<0.4	<37	<13	<0.006	17	<0.02	<2.2
BDE156	hexaBDE 2,3,3',4,4',5 -	<32	<0.003	<0.002	<0.2	<1.3	<0.7	<0.002	<0.4	<13	<0.4	<37	<13	<0.002	<0.4	<0.005	<2.2
BDE184	heptaBDE 2,2',3,4,4',6,6'-	<32	<0.003	<0.002	<0.2	<1.3	<0.7	<0.002	<0.4	<13	<0.4	<37	<13	<0.002	1.1	<0.005	<2.2
BDE183	heptaBDE 2,2',3,4,4',5',6-	686	0.002	0.01	<0.2	<1.3	<0.7	<0.002	<0.4	<13	0.9	59	<13	<0.002	5.3	<0.006	15
BDE191	heptaBDE 2,3,3',4,4',5',6-	<32	<0.003	<0.002	<0.2	<1.3	<0.7	<0.002	<0.4	<13	<0.4	<37	<13	<0.002	<0.4	<0.005	<2.2
BDE197	octaBDE 2,2',3,3',4,4',6,6'-	367	<0.003	<0.002	<0.2	<1.3	<0.7	<0.002	<0.4	<13	<0.4	85	<13	<0.002	<0.4	<0.005	7.2
BDE196	octaBDE 2,2',3,3',4,4',5,6'-	258	<0.003	<0.002	<0.2	<1.3	<0.7	<0.002	<0.4	<13	0.9	114	<13	<0.002	<0.4	<0.005	3.3
BDE209	decaBDE 2,2',3,3',4,4',5,5',6,6'-	94445	0.05	0.03	<0.6	<3.2	<1.8	0.1	<1.1	78	1300	104347	<32	0.2	16	0.030	1334
TBBP-A	Tetrabromobisphenol	3540	1.3	<0.003	<0.003	<1.4	<0.8	<0.003	<0.5	25	48	<42	<15	7.7	<0.5	10	146
α- HBCD	Hexacyclododecane	<71	<0.007	<0.005	<0.006	1017	481	<0.005	<1.0	<0.005	<1.0	<83	<29	<0.005	<0.9	<0.1	<5.0
β-HBCD	Hexacyclododecane	<72	<0.007	<0.005	<0.006	472	165	<0.006	<1.1	<0.006	<1.1	<83	<29	<0.005	<0.9	<0.1	<5.1
γ-HBCD	Hexacyclododecane	<73	<0.007	<0.005	<0.006	2694	2814	<0.007	<1.2	<0.007	<1.2	<83	<29	<0.005	<0.9	<0.1	<5.2
Unknown 1 Unknown 2 Unknown 3	X times higher than BDE 209 (based on peak area)									0.3 X			X X	4 X 5 X		1500 X 400 X 5000 X	2 X

Calculated Bromine mg/kg *(Using above Lab data)*	Total Tetra BDEs (Br mass=65.8%)	0	0	9	0	0	0	0	0	0	0	0	0	0	213	0	0
	Total Penta BDEs (Br mass=70.4%)	0	0	4	0	0	0	0	0	0	0	0	0	0	872	0	0
	Total Hexa BDEs (Br mass=74.5%)	0	0	0	0	0	0	0	0	0	0	0	0	0	199	0	0
	Total Hepta BDEs (Br mass=77.3%)	531	0	0	0	0	0	0	0	0	1	46	0	0	5	0	11
	Total Octa BDEs (Br mass=79.8%)	499	0	0	0	0	0	0	0	0	1	159	0	0	0	0	8
	Total Nona BDEs (Br mass=81.7%)	2584	0	0	0	0	0	0	0	2	34	2736	0	0	0	0	37
	Total Deca BDEs (Br mass=83.3%)	78672	0	0	0	0	0	0	0	65	1083	86921	0	0	13	0	1111
	Total TBBP-A (Br mass=58.8%)	2082	1	0	0	0	0	0	0	15	28	0	0	5	0	6	86
	Total HBCD (Br mass=74.7%)	0	0	0	0	3125	2585	0	0	0	0	0	0	0	0	0	0
	Total unknown (Br mass=75%)								0				9		0	207	2667
Total Bromine Lab (mg/kg)		84367	1	14	1	3125	2585	0	0	82	1146	89862	9	5	1303	213	3921
XRF Br Value mg/kg product		172866	89907	4068	1659	6923	3626	1208	2804	79014	3272	193871	69591	99697	2529	29649	1198
Total Br (lab) value : XRF Br value		0.49				0.45	0.71				0.35	0.46			0.52		0.33
Lab : XRF Correlation factor		0.5 *															

Figure 2 The laboratory analysis of 16 plastic samples and their calculated total bromine value (mg/kg). (Note that the XRF Analyser readings (mg/kg) are shown in the shaded row at bottom of table. See Appendix F for further information.)

2.4 BDE contained in exported products

Our findings indicate that a wide range of products manufactured in New Zealand contain polymers which we have identified (through the imports sample analysis and literature) as potentially containing quantities of BDE within their polymer components. New Zealand exports relatively small quantities of domestic appliances which could contain BDE, an example of a major appliance exporter is Fisher and Paykel Appliances although the recent closure of their Dunedin plant has diminished the quantity.

Our search of New Zealand Statistics indicated that there is a range of New Zealand manufactured commercial type export products that may contain BDE. Examples include polymer and rubber hosing and pipes, insulated wire and electrical components such as circuit breakers, insulators, switches etc. Niche technology products play a small part in export quantities.

Our investigations of exporting companies and literature review indicates that the number of export products containing BDE retardants will decline over time as countries sign up to international frameworks that limit their use in manufacturing and require the use of alternatives (i.e. non halogenated flame retardants). The trend is for BDE to be used in these types of products and more to be manufactured in other countries due to competitive advantages in production such as wages.

A 2005 study found that 28.7 percent of polymer products manufactured in New Zealand are either directly or indirectly exported (Wittington, 2005). This report also indicates that the vast majority of New Zealand manufactured polymer is used for packaging from LDPE, PET and HDPE, and PP and that as a major exporter of food products, this packaging is unlikely to require flame retardant qualities.

The summary of the exported products statistics search is presented below in Table 5. Using the same approach as the quantification of imported volumes, a search for trade import data has been undertaken for the period 1988 – 2009 and has been extrapolated to estimate volumes of BDE using sample BDE % and weight analysis. Our analysis includes the 252 product categories and the list is summarised into three broad areas below. While we acknowledge that the list is not exhaustive, it covers the main areas including those that we have weight and BDE percentage data for.

1. *Household consumer products* such as kitchen and household electrical appliances (34 product categories).

2. *Construction and agriculture polymer products*, such as hoses, tubes, pipes and fittings, rubber conveyor belts and automotive parts (107 product categories).

3. *Electrical goods* such as circuit breakers, printed circuit boards, switches, television circuits and connectors, cable covering, insulated wire and electrical conductors (111 product categories).

A more detailed breakdown of the estimated quantities is contained in Appendix A.

Table 6 Summary of BDE export volumes of (1988 – 2009)

Year	Estimated Export Quantities (tonnes) Exports Total
1988	11
1989	8
1990	8
1991	7
1992	8
1993	11
1994	15
1995	21
1996	18
1997	23
1998	27
1999	28
2000	29
2001	25
2002	22
2003	28
2004	27
2005	21
2006	20
2007	17
2008	12
2009	7

3 Assessment of the fate of BDEs in waste

To track the fate of BDEs in articles we have focused on reviewing New Zealand and international literature in this area. Volumes of recycled polymers are discussed in Section 4.2 below. This section indicates that very little recycling of BDE containing products has been undertaken historically in New Zealand (or internationally) and therefore in New Zealand most BDE containing waste articles are likely to be located in landfills.

Only recently (last 3-5 years) have a number of specialist electronic equipment (e-waste) recycling operators emerged in New Zealand along with one expanded polystyrene recycler in Porirua. Prior to this most e-waste was deposited in landfills. Using stated assumptions on the rate of disposal to landfills and product lifetimes, it is estimated that total deposited tonnes will reach 1,200 tonnes within 10 years, although the rate of increase is slowing with a reduced level of prevalence in both imported and New Zealand made goods.

Our statistical analysis has tracked two potential sources of BDE containing articles that could be deposited in New Zealand landfills[4]:

- Imported finished consumer and industrial products
- Imported polymer resins that are used to make polymer based material that may contain BDE and be deposited in landfills

Table 7 below shows our estimate of the volume of BDE that is entering New Zealand landfills per year.

[4] This information is based on an interrogation of New Zealand Statistics harmonised trade data, an extrapolation of Plastics New Zealand mass balance survey data (2008) as an indication of polymer resins product end use, and sample analysis of products by our team to understand BDE% for articles and weights.

Table 7 Estimate of BDE flows into New Zealand landfills (tonnes)

	In-Use	Entering Landfill	Cum'tve landfill total
1988	6	1	9
1989	15	2	11
1990	25	3	13
1991	37	4	17
1992	51	20	37
1993	66	20	57
1994	125	20	77
1995	181	21	98
1996	237	22	120
1997	293	6	126
1998	347	9	135
1999	372	41	176
2000	389	47	223
2001	410	43	266
2002	427	54	320
2003	445	59	379
2004	436	51	430
2005	433	48	478
2006	426	48	526
2007	391	64	590
2008	325	90	680
2009	281	62	743

The ‘in use’ column shows a maximum during 2005. Before this year the mass of BDE in products ‘in use’ was increasing annually. After this date, mainly due to lower amounts of BDE in imported and manufactured products the mass of BDE in articles ‘in use’ has started declining. Based on an average lifespan of product of 15 years it will be post 2040 before the ‘in use’ volume is back at pre 1990 levels.

4 Profile of BDE flows in New Zealand

The graph below contains estimated quantities of BDE in various sources of the New Zealand environment. The estimates have been made using the source stated in the Method section. A number of assumptions have been made in developing this profile.

Assumptions used and sources of information

Articles likely to contain BDE- review of New Zealand and international literature and survey of New Zealand manufacturing companies. This work enabled a percentage of finished product imports containing BDEs to be estimated.

Percentage of BDE per articles derived from finished goods sample and XRF analysis. The analysis provided data for "percentage of BDE" in homogenous parts of finished consumer articles for the data base.

Weight per article- physical weighing of homogenous parts of sampled articles.

Percentage of imported goods likely to contain BDE- assessment based on surveying and interviewing of manufacturing companies and review of literature for example, Polymers New Zealand mass balance survey of imported virgin resin polymer of various forms (PET, HDPE, PVC, L/LLDPE, PP, PS, EPS, Other e.g., ABS, SAN). This data was used to develop an estimate of goods and uses that are likely to require flame retardant.

Lifetime of articles- assessment of individual imported finished goods based on literature.

Volume "disposed" and "in use"- Excel based formula to derive values from assessment of lifetime per article, import and landfill data.

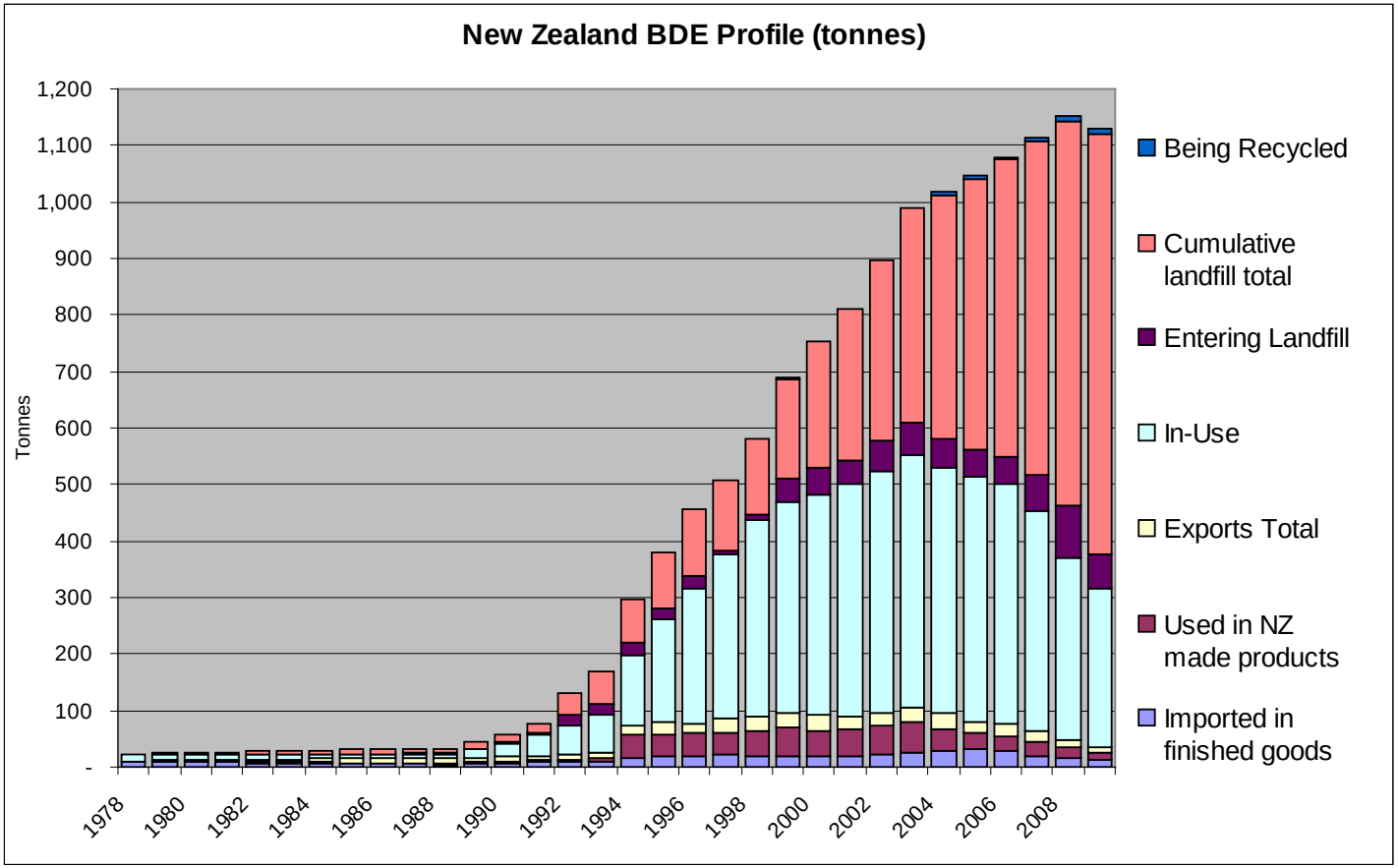
Volume Recycled- Excel based formula based on literature estimates of recycling and also derived from "in-use" and disposed" estimates.

Volume disposed in landfills- Excel based formula derived from other database values and verified against literature estimates. This data require estimates to be made on the likely change in BDE content over three periods in the analysis:

- 1988 – 1994 (1988 is the start of StatisticsNZ trade records)
- 1994 – 2004
- Post 2004 (since 2004 a number of major polymers manufacturers have limited the use of BDEs in line with moves in the EU & North America).

The graph below illustrates the estimated flow of BDE from various sources and is in line with quantities estimated by interview participants and international literature. Note that all bar-sections are annual quantities except the 'pink' section for 'cumulative landfill total'

From 2006 onwards a decline in all yearly quantities is seen except in the 'Being Recycled' group, a dubious development.



Graph 1 Estimated quantities of BDE in various sources in the New Zealand environment

Note: all figures in the chart are annual tonnages, except for the landfill figures which represents the cumulative tonnages of BDEs present in landfills. The annual 'in-use' tonnages comprises the net amount in any one year made up from (i) the imported goods still in use PLUS (ii) the products made in NZ and still in use in NZ (i.e. both (i) and (ii) are accumulated over the product lifetimes) MINUS (iii) any exports and (iv) articles disposed to land.

5 Risk analysis

The quantitative estimate of BDE in New Zealand involves a number of assumptions to be made and these have been set out in the relevant Sections above. Because of the uncertainty around the percentage of BDE in used articles in New Zealand we have estimated the amount of BDE currently "In-use" in New Zealand and that contained in landfills by providing a distribution around percentage of BDE in sampled articles as a key risk variable.

The impact of making estimates of uncertain variables is accounted for by using Quantified Risk Analysis (QuRA^{TM}) to model estimates for key uncertain variables. This involves identifying the likely range (90% confidence interval) that the key uncertain variables may fall within (i.e. low, most likely, and high) assuming a triangular distribution (a simplified/abbreviated version of the bell-shaped distribution). QuRA^{TM} results in an expected output (average output over 5,000 iterations) and the probability that the output (in this case total mass of BDE in New Zealand landfills) will fall between particular ranges (typically the 5% and 95% levels).

The results of the risk analysis are shown in the table below. Using QuRA^{TM} to account for uncertainty around key variables gives the following results:

Table 8 The results of using QuRA^{TM} to account for uncertainty around the key variables

Risk outputs	Tonnes of BDE "In-Use" (2009)	Annual tonnes of BDE entering landfills	Tonnes of BDE in landfills (2009)
There is a 5 percent chance that the total tonnes will be ***less than***	163	46	397
There is a 5 percent chance that the total tonnes will be ***greater than***	440	90	1,390
Mean value	281	62	742

Note: QuRA^{TM} is a Nimmo-Bell-developed methodology for quantifying the uncertainty of making point estimates on key risky variables and has been mainly applied to discounted cashflow analysis (economic analysis). QuRA^{TM} uses Monte Carlo analysis in @RISK and has been applied to the key risky variables in this estimate of BDE quantities used in New Zealand.

5.1 Sampling and analysis of landfill leachate

To test the hypothesis 'landfills are a secure depository for PBDE containing polymers' three landfills were selected for leachate sampling and analysis:

Hampton Downs Landfill	Meremere	cell 1 operated July 2005 to July 2009
Greenmount Landfill	East Tamaki, Auckland	operated 1979 to 1 July 2005
Taupo District Council Landfill	Broadlands Rd, Taupo	operated from 1985

Further details about these landfills and the sampling of them can be found in Appendix G.

5.1.1 Extraction of samples

Brominated flame retardants have a very low solubility, however in the presence of organic acids that accumulate in landfills, the solubility can increase significantly. Co-disposal landfills therefore could potentially discharge significant amounts of brominated flame retardants through their leachate.
Being very non-polar they would also have an affinity to small particulates. Therefore two extracts have been created from each leachate sample:

1. FIL - a particulate sample on Whatman glass microfibre filters GF/F
2. SPE - an extract of the dissolved phase using Waters Oasis HLB LP solid phase extraction (SPE) cartridges which contain a permeable gel with very high affinity for non-polar compounds.

Both required vacuum to be applied to pull the sample through the filter media. The glass microfiber filters blocked quite quickly. The leachate from Taupo DC landfill (TDC) and Greenmount (GM) blocked the filters after 200 ml, so 10 filters were needed to filter 2 litres of leachate. The leachate from Hampton Downs (HD) blocked the filters after just over 100 ml and the SPE gel after 1.7 litres had passed.
Using the Oasis SPE cartridges the vacuum needs to be regulated, to obtain a steady flow of not more than 1 ml/min. Prior to extraction the Oasis cartridges were conditioned with 5 ml Baker Ultra Resi-analysed Methanol (ultra pure for organic residue analysis), as per the Oasis manual.

Table 9 The extraction overview of the volume of leachate and the number of filters and cartridges used

Sample ID	Leachate volume used	Number of filters /cartridges
HD-FIL	2 x 1.7	2 x 17
HD – SPE	2 x 1.7	2
TDC-FIL	1 x 2 ltr	20
TDC-SPE	1 x 2 ltr	1
GM- FIL	2 x 2 ltr	2 x 10
GM-SPE	2 x 2 ltr	2

The filters (as a stack) and the solid phase extraction gel was analysed using a handheld XRF analyser. XRF analysis results of Filters and SPE cartridges showing zinc and total bromine.

Table 10 The XRF analyser results for zinc and total bromine values for the various filters and cartridges

Sample No.	type	Zn	Br	Br Av
HD	filters	29662	50	
HD	filters	28650	39	
HD	filters	28373	54	**48**
HD	gel	11	11	
HD	gel	12	14	
HD	gel	14	13	**13**
TDC	filters	24471	10	
TDC	filters	24262	9	
TDC	filters	24515	10	**10**
TDC	gel	11	7	
TDC	gel	10	8	
TDC	gel	9	6	**7**
GM	filter	22868	38	
GM	filter	23107	20	
GM	filter	23028	38	
GM	filter	26801	75	
GM	filter	26794	69	
GM	filter	27311	72	**52**
GM	gel	12	14	
GM	gel	9	18	
GM	gel	10	12	**15**

The XRF analyser has been used in 'Soil Mode' and to obtain the sensitivity for bromine the element rate for bromine was adjusted.
The analyser was calibrated on 2 polythene European Reference Material samples containing 808 and 98 mg/kg Br.
A side effect of changing the element rates was that the analyser did not automatically display < LOD when the limit of detection is not exceeded, instead numerical results below the LOD are displayed.

Clearly the particulate filtration has held back all silts and organic particles on which metals and bromine containing compounds have adsorbed. Analysing the gel the zinc level is at the detection level of the XRF analyser (10 mg/kg), while bromine is detected above detection limit (also 10 mg/kg) in the GM sample, however, is at or below detection / significance level in the other two gel samples.

Analysing total bromine will over estimate the concentration of brominated flame retardants and certainly the concentration of only the brominated diphenyl ethers.

The filters and SPE cartridges of two landfills, Hampton Downs and Greenmount were analysed for brominated flame retardants including; BDE's, TBBP-A and HBCD (α, β and gamma). Analysing these compounds is not a routine analysis. The responsible person for this contract has been Prof. Dr. J. de Boer and the research manager drs. S.H. Brandsma. The analysis results have been reviewed by Dr. P.E.G Leonards. After filtration and trapping of the flame retardant on the SPE columns the filters and columns the samples were sent back to IVM for analysis.

Prior to the extraction steps internal standards (BDE58, ^{13}C BDE209, ^{13}C HBCD and ^{13}C TBBP-A) were added to all samples to ensure a proper identification and reliable quantification. One blank and one spike were measured as quality control.

IVM analysed for the PBDEs, TBBP-A and the HBCD isomers in these samples (Table below). Cleanup was performed following IVM protocol using silica columns and gel permeation chromatography (GPC). The purified extracts were analysed by gas chromatography (GC) with electron capture negative ionization technique and mass spectrometry detection (GC/ENCI-MS) for PBDEs, using a 50 meter GC column and measuring the specific bromine m/z 79 and 81. This is a highly sensitive method and was described by De Boer et al. (2001, 2006)[5]. All analyses were carried out under the specific conditions for PBDE analysis as described in De Boer et al. (2001, 2006).

[5] Boer, J. de, C. Allchin, R. Law, B. Zegers, J.P. Boon (2001). Method for the analysis of polybrominated diphenylethers in sediments and biota. *Trends Anal. Chem.* 20, 591-599.

After the PBDEs were measured the purified extracts were redissolved in Methanol and analysed for TBBP-A and HBCD on the LC-MS/MS, using multiple-reaction monitoring (MRM) of the parent and the daughter ion (Boer et al. 2006)[6]. The plastic product was extracted following IEC ACEA protocol "Determination of levels of regulated substances in electro technical products". However, the detection of the PBDEs, TBBP-A and HBCD was achieved by GC-(NCI)MS and LC-MS/MS following IVM protocol. The recoveries reported by the laboratory of the BDE/TBBP-A and HBCD are > 90%.

Table 11 The laboratory results showing the concentrations of the various BDEs, TBBPA and HBCD present in the filters and cartridges produced from the leachate samples of Hampton Downs and Greenmount landfills

Results	ng/L water dissolved		particle-bound	
lims nr.	10/0426	10/0427	10/0428	10/0429
sample code	BFR-SPE-HD	BFR-SPE-GM	BFR-FIL-HD	BFR-FIL-GM
BDE28	**1.8**	<0.02	**1.1**	**0.06**
BDE49	**11**	<0.02	**11**	**0.3**
BDE71	<0.03	<0.02	<0.02	<0.02
BDE47	**82**	**0.04**	**86**	**15**
BDE66	<0.3	<0.3	<0.03	<0.02
BDE77	<0.03	<0.02	<0.3	<0.2
BDE100	**12**	<0.1	**32**	**7.4**
BDE119	<0.1	<0.1	<0.1	<0.1
BDE99	**54**	**0.1**	**169**	**44**
BDE85	**2.7**	<0.1	**7.1**	**3.0**
BDE126	**0.1**	<0.02	**0.9**	**0.1**
BDE154+BB153	**2.4**	<0.04	**21**	**4.8**
BDE153	**2.3**	<0.04	**24**	**7.0**
BDE138	<0.05	<0.04	<0.05	<0.04
BDE156	<0.05	<0.04	<0.05	<0.04
BDE184	<0.05	<0.04	<0.05	<0.04
BDE183	<0.05	<0.04	**8.2**	**0.3**
BDE191	<0.05	<0.04	<0.05	<0.04
BDE197	<0.05	<0.04	**3.4**	**0.06**
BDE196	<0.05	<0.04	**10**	<0.04
BDE209	**0.4**	<0.1	**21**	**2.8**
total BDE	**168.6**	**0.2**	**395.0**	**84.6**
TBBP-A	**3.4**	**1.7**	**2.26**	**0.94**
α- HBCD	<0.1	<0.1	<0.1	<0.1
β-HBCD	<0.1	<0.1	<0.1	<0.1
γ-HBCD	<0.1	<0.1	<0.1	<0.1
BDE+TBBP-A	**172.0**	**1.9**	**397.3**	**85.6**

From the results we interpret the leachate sample from the Greenmount landfill is very likely diluted as the landfill operated for 25 years, opening in 1979 and being closed in 2005 with the dissolved BDE concentration in the leachate being only 1 % of that found in the leachate from Hampton Downs, cell 1 operating for only 4 years. The site engineer at Greenmount landfill had no full insight in the system and significant difficulties opening a collection well made comparison between different collection wells impossible within the timeframe of this study.

Boer, J. de (2006). The use of GC-MS and LC-MS in the environmental monitoring of brominated flame retardants. In: M.L. Gross and R.M. Caprioli (eds.): Encyclopaedia of Mass Spectrometry, Elsevier, Amsterdam, The Netherlands, pp.571-579

[6] Boer, J. de, D.E. Wells (2006). Pitfalls in the analysis of brominated flame retardants in environmental, human and food samples – including results of three international interlaboratory studies. *Trends Anal. Chem*. 25, 364-372.

The leachate sample from the closed cell 1 at Hampton downs was taken from a pipe discharging in a collection well. The pipe was pointed out by the site engineer who did have good knowledge of the leachate collection system. This sample is very likely representative of the leachate of this landfill cell which has been in operation from mid 2005 to mid 2009.

Total concentration of the BDE's analysed in dissolved phase and bound to particulates is 168.9 and 395 ng/ltr respectively. Combined there is 564 ng of BDE leaving the landfill in every liter of leachate. The average daily leachate discharge is 60,000 litres (2 road tankers / day) from cell 1 (closed) and cell 2 (operational). Assuming the BDE concentration in the leachate from Cell 2 is equal to that from cell 1, which is an over estimate, this means daily 0.034 gram BDE is leaving the landfill.
Even adding the small amount of TBBP-A, the annual discharge from the landfill is less than 12.5 gram. This assumes the only other route out of the landfill, evaporation through the 2 meter thick clay cap, of these very low volatility compounds is virtually zero.

At an average BDE concentration of 5% in polymers this equates to 1 piece of plastic of 250 grams entering the environment. This is a very small amount in comparison with the content of the landfill. In the Auckland Regional Waste Survey (2009) the percentage of plastics disposed in landfills is estimated at 8.9 %[7]. During the 4 years of operating cell 1 approximately 2.5 million tons of waste was received. Thus about 222 million kilo's of plastics are contained in the landfill. The quantity of BDE's escaping annually represents around 1 billionth of the amount likely held in the landfill cell 1.

This is clearly an infinitesimal volume leading to the conclusion that properly designed and managed landfills are a secure final depository of BDE containing plastics.

7 http://www.arc.govt.nz/albany/fms/main/Documents/Plans/Technical%20publications/Technical%20reports/2009%20100-150/TR%202009_107%20Auckland%20Waste%20stocktake%20and%20strategic%20assessment%202009.pdf

5.2 BDEs in the New Zealand recycling system

There are very few articles containing commercial pentaBDE and octaBDE that are recycled in New Zealand. The majority of recycled polymer articles recovered by commercial recycling companies are in the packaging and food-contact categories such as milk and soft drink bottles (recycle classes 1 and 2). These are unlikely to contain BDEs. Recycle category 3, PVC, is self extinguishing. This holds mainly for rigid PVC. Soft PVC contains phthalates to make the PVC pliable, however phthalates are flammable and therefore flame retardants are added to soft PVC in applications where heat or source of ignition is expected.

Category 4 Low density polyethylene is also mainly used in applications where flame retardants are rarely needed. As our research has shown BDEs are limited to a small range of specialist applications and electronics. Some of these fall into the categories 5 and 6, however mainly into 7.

A new form of recycling is that involving expanded polystyrene (EPS). To the author's knowledge two firms recycle their internal EPS waste, and a third fabricates insulation sheets from recycled EPS. The latter process involves granulating and steam moulding into desired sheets and blocks that are sold for under floor insulation and as under concrete floor foundation blocks.

When the recycled product is BDE free as most modern EPS is both uses meet current BFR standards. However when older EPS is used, limiting the use to concrete floor foundations would be preferable.

The ban on concentrations of BDE above 0.1% in polymers has had an impact on polymer recycling. As more and more products include recycled polymers, it has become critical to know the BDE concentration in these polymers, either by tracing the origins of the recycled polymers to establish the BDE concentrations, or by measuring the BDE concentrations from samples. Polymers with high BDE concentrations are costly to handle or to discard, whereas polymers with levels below 0.1% have value as recyclable materials.

In our estimates of BDE in the recycling system we have not estimated articles containing less than 0.05% BDE in homogenous polymer parts.

The laboratory analysis of consumer good polymers has found that mixtures of 'modern' BFRs like HBCD and TBBP-A can accompany 'older' BFRs like PBDEs. We have found an advantage in the manufacturing process using both types of flame retardants and have to conclude that quantities of recycled polymers have been used in the manufacture of these goods. Despite the 'dilution' of BDEs in those products the effect is that they remain in our environment and will be influencing our health much longer compared to using BDE free polymers and disposing of the BDE containing polymers to landfills or incinerators.

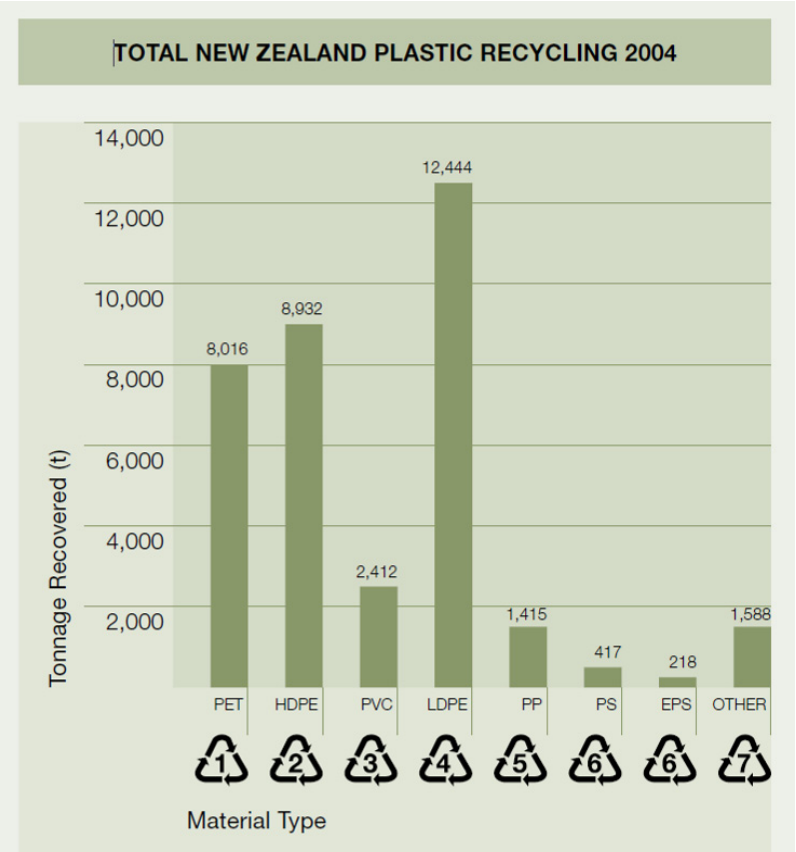


Figure 3 **Total amount of plastic recovered in 2004 by material type (Source: PNZ Recycling Survey, 2005)**

Ref: http://www.polymers.org.nz/_attachments/docs/pnz-id-code-web-2009-2.pdf

From the bar chart above it is clear that the current New Zealand polymer recycling industry mainly deals with non-BFR containing polymers. BFRs are mostly associated with recycling groups 3 (soft PVC), 6 and 7. Often the specific use for which the articles were intended is very indicative of the presence of BFRs. The age of the article can give some indication of the type of BFR, penta and octa BDEs present in older and largely US derived polymer products, deca-BDE in older as well as more modern polymers (US, EU and NZ made) and non-BDE BFRs in more recent products, increasing from 2006 onwards.

In Figure 5 on the next page the common uses of polymers with recycling numbers 1 – 7 is provided. Brominated flame retardants (BFR's) are not allowed to be used in polymers which may have contact with food. Clearly the majority of the polymer materials in recycle groups 1 to 6 recovered from household recycling therefore do not contain BFR's.

This document is printed on polypropylene, code number 5. It can be recycled.

PLASTICS NEW ZEALAND

SYMBOL	TYPE OF PLASTIC	PROPERTIES	COMMON USES	RECYCLED IN	PACKAGING	NON PACKAGING
1 PET	**PET** Polyethylene Terephthalate	Clear, tough, solvent resistant, barrier to gas and moisture, softens at 70°C	**Soft drink and water bottles**, salad domes, biscuit trays, salad dressing and peanut butter containers, **fleece clothing** and geo-textiles	Pillow and sleeping bag filling, clothing, soft drink bottles, carpet		
2 HDPE	**HDPE** High Density Polyethylene	Hard to semi-flexible, resistant to chemicals and moisture, waxy surface, opaque, softens at 135°C, easily coloured, processed and formed	Crinkly shopping bags, freezer bags, **milk bottles**, ice cream containers, juice bottles, shampoo, chemical and detergent bottles, buckets, rigid agricultural pipe, **milk crates**	Recycling bins, compost bins, buckets, detergent containers, posts, fencing, pipes		
3 PVC	**PVC** Unplasticised Polyvinyl Chloride PVC-U Plasticised Polyvinyl Chloride PVC-P	Strong, tough, can be clear, can be solvent welded, softens at 75°C Flexible, clear, elastic, can be solvent welded	**Cosmetic containers**, electrical conduit, **plumbing pipes** and fittings, blister packs, wall cladding, roof sheeting, bottles Garden hose, shoe soles, cable sheathing, blood bags and tubing, watch straps, commercial cling wrap	Flooring, film and sheets, cables, speed bumps, packaging, binders, mud flaps and mats		
4 LDPE	**LDPE** Low density Polyethylene **LLDPE** Linear low density Polyethylene	Soft, flexible, waxy surface, translucent, softens at 80°C, scratches easily	**Cling wrap**, rubbish bags, squeeze bottles, black irrigation tube, black mulch film, rubbish bins, **shrink wrap**	Rubbish bin liners, pallet sheets, slip sheets		
5 PP	**PP** Polypropylene	Hard but still flexible, waxy surface, softens at 145°C, translucent, withstands solvents, versatile	**Dip pottles** and ice cream tubs, potato chip bags, straws, microwave dishes, kettles, garden furniture, lunch boxes, blue packing tape, **automotive parts**	Pegs, bins, pipes, pallet sheets, oil funnels, car battery cases, trays		
6 PS	**PS** Polystyrene	Clear, glassy, rigid, brittle, opaque, semi-tough, softens at 95°C. Affected by fats and solvents	CD cases, plastic cutlery, imitation 'crystal glassware', low cost brittle toys, video cases, **water station cup, safety helmets**	Coat hangers, coasters, white ware components, stationery trays and accessories		
6 EPS	**EPS** Expanded Polystyrene	Foamed, light weight, energy absorbing, heat insulating	Foamed polystyrene hot drink cups, hamburger take-away clamshells, **foamed meat trays**, protective packaging for fragile items, insulation, **insulation panels**	Car parts, concrete aggregate, plastic timber		
7 OTHER	**OTHER** Letters below indicate ISO code for plastic type including SAN (styrene, acrylonitrile), ABS (Acrylonitrile butadiene styrene), PC (polycarbonate), Nylon, degradable plastic e.g. PLA	Includes all other resins, multi materials (e.g. laminates) and degradable plastics. Properties dependent on plastic or combination of plastics	**Packaging**, car parts, appliance parts, **computers**, electronics, water cooler bottles, medical devices,	Car parts, concrete aggregate, plastic timber		

Figure 4. Types of plastic; their properties, uses and recycled use
Ref: http://www.polymers.org.nz/_attachments/docs/pnz-id-code-web-2009-2.pdf

5.3 BDEs in house dust – a case against recycling BDE containing polymers

The aim of the Stockholm convention article 6 is to limit the exposure to persistent organic pollutants, such as the brominated flame retardant group of the poly diphenyl ethers (PBDEs).

	Study Location(s)	Number of samples	Total PBDEs (ppb)		Deca (ppb)	
			Average	Range	Average	Range
House Dust	United Kingdom	10 pooled samples of 10 houses each	10,543	4,254 - 20,505	9,820	3,800 - 19,900
	EWG study	10 houses	4,629	614 - 16,366 (41,203)	2,394	< 400 - 7,510
	Cape Cod	5 houses	3,699	1,412 - 11,426	1,232	916 - 1,472
	Germany	25 houses	1,807	145 - 27,008	1,394	137 - 19,100
	Norway, Finland	2 houses	267	129 - 405	180	100 - 260
Office dust	Netherlands, Finland, Sweden, Italy, Denmark	7 Parliament buildings	2,371	437 - 7,100	2,129	330 - 6,900
	Netherlands	3 internet providers	405	311 - 546	360	260 - 490

Sources: [46, 47, 107, 108]

Table 12 In-building dust concentrations of BDE's taken from EWG's 'In the Dust' report[8]

Although the relationship between the presence of PBDEs in house / office dust in relation to the concentration of PBDEs in the human body has been poorly researched and certainly beyond the scope of this study, there is nevertheless evidence of the rise of PBDEs in fats of the human body such as in breast milk that reveals a high degree of correlation with the increased use of PBDEs. In the figure below, the increase of PBDEs in human breast milk in Sweden over the period that the use of PBDEs was rapidly rising (1972 – 1997).

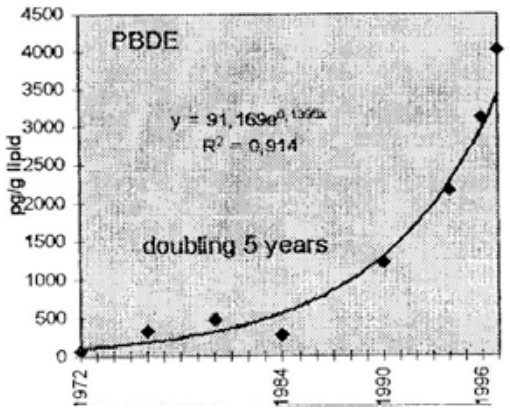


Figure 5. Often called "the graph that launched a thousand papers" (From Meironyt D, Bergman A. 1999. Analysis of Polybrominated Diphenyl Ethers in Swedish Human Milk, 1972-1997. Journal of Toxicology and Environmental Health. Part A, (58):329-341.)[9]

[8] http://www.ewg.org/book/export/html/8449 especially ref's:
[46] Greenpeace. 2003. Consuming Chemicals: Hazardous chemicals in house dust as an indicator of chemical exposure in the home.
[47] Rudel R, Camann D, Spengler J, Korn L, Brody J. 2003. Phthalates, alkylphenols, pesticides, polybrominated diphenyl ethers and other endocrine-disrupting compounds in indoor air and dust. Environmental Science Technology. 37(20): 4543 — 53.
[107] Knoth W, Mann W, Meyer R, Nebhuth J. 2002. Organohalogen Compounds 58: 213 — 216.
[108] Santillo, D, P Johnston, K Brigden. 2001. The presence of brominated flame retardants and organotin compounds in dusts collected from Parliament buildings from eight countries. Greenpeace Research Laboratories, Department of Biological Sciences, University of Exeter, UK.

[9] Journal of Toxicology and Environmental Health, Part A, Volume 58, Issue 6 Nov. 1999 , pages 329 - 341

The US Geological Survey (USGS) reported in 2004 levels of up to 200 ppb in human breast milk in the US.[10]
The same report also indicates Deca-BDE rapidly breaks down in sunlight forming lower brominated PBDEs which are more bio-available and potentially more toxic.

5.4 Natural breakdown and bio-accumulation of PBDE's

The natural breakdown and bio-accumulation of PBDEs mentioned in the USGS report has also been reported in the study carried out by Renee Sharp and Sonya Lunder of the Environmental Working Group (EWG)[11]. However unlike Europe, Asia and New Zealand the Americas still used a high percentage of commercial Penta PBDE in 2001 as is shown in the table below.

Table 13 Global use of commercial PBDE products in 2001 (in thousands of pounds)

Commercial PBDE Product	Americas	Europe	Asia	Other	Total	Percent used in the Americas
Deca	54,010	16,760	50,710	2,315	123,700	44%
Penta	15,650	331	331	221	16,530	95%
Octa	3,307	1,345	3,307	397	8,356	40%

They also found a shift in the ratio of the two main PBDE congeners found in the Penta product: While the Penta mixture contains sixty percent PBDE-99 and forty percent PBDE-47, five out of their ten dust samples contained a significantly higher percentage of PBDE-47. In other words, half of the homes tested had an abnormal ratio of these chemicals as compared to the ratio found in the commercial Penta product.
Because PBDE-99 has five bromines while PBDE-47 only has four, their data suggests that PBDEs are breaking down inside study homes. This is of particular concern because PBDE-47 is more bio-accumulative than PBDE-99 or -209. In EWG's breast milk study12, for example, we found that women had at least twice as much PBDE-47 as PBDE-99 in their bodies[13]. This finding also underscores the concern for Deca which also appears to break down in people's homes and the environment.

Several other studies also confirm the reductive de-bromination mechanism of the photolytic degradation of PBDEs is rapid in photodecomposition experiments. The data obtained suggests that the photo-degradation of BDE-209 is a sequential de-halogenation mechanism.[14] The concept of de-bromination of deca-BDE in the environment is not accepted by all. Kellyn Betts in the Environmental Science and Technology Journal (September, 2008) reports that Klaus Rothenbacher a toxicologist from British Columbia accepts that while deca-BDE can undergo de-bromination in the lab his conclusions from six recent studies are that there are no indicators of this de-bromination in the environment. Further studies are discussed notably from Jeoff Gearhart whose studies found

[10] Brominated Flame Retardants in the Environment, USGS, 2004, ref.: http://www.cerc.usgs.gov/pubs/center/pdfDocs/PBDE.pdf
[11] http://www.ewg.org/files/InTheDust_final.pdf
[12] http://www.ewg.org/book/export/html/8406 or in pdf: http://www.ewg.org/files/MothersMilk_final.pdf
[13] This had risen to 3 times by 2008, ref.: http://www.ewg.org/reports/pbdesintoddlers
14 Photolytic degradation of polybromodiphenylethers under UV-lamp and solar irradiations, Shih YH, Wang CK, Journal Hazard Materials. 2009 Jun 15;165(1-3):34-8. Epub 2008 Oct 4. Ref. http://www.ncbi.nlm.nih.gov/pubmed/18996643

that deca-BDE present in sealed quartz cuvettes and placed inside cars was found to breakdown to lower molecular weight congeners with as much as 63% of the original bromine not present as a PBDE. The controversy continues and there is the obvious need for further research. The limitations of this study and the time constraints involved mean a full review of available literature is not possible but with the high levels of Deca-BDE found in house dust as was shown above, even if the breakdown occurs slowly or to a small degree, Deca could nevertheless be an important source of exposure to the more toxic and bio-accumulative forms of the PBDEs.

From the BDE analysis results we obtained in this study we can see some articles have not only high Deca-BDE levels but also contain some TBBP-A. The interpretation by researchers at the Institute for Environmental Studies in the Free University of Amsterdam, Holland, is that during the manufacture of these goods or of the polymers to make these goods some recycled polymers have been blended with virgin polymers.

		mg/kg		
Sample	Sample no.	Deca	TBBP-A	remarks
LCD TV backing	BFR-1	94445	3540	
Electrical plug Elta Chinese	BFR-10	1300	48	
Electrical power board HPM China	BFR-11	104347	<42	Virgin – only deca
Transonic CD player/ tc2615cdaux/ handle	BFR-16	1334	146	

Table 14: The laboratory quantities of decabromodiphenyl ether and tetrabromobisphenol A found in some of the plastic samples

Despite the low levels of commercial Penta BDE imported and used in manufacturing the natural breakdown of commercial Deca BDE could lead to a future rise in presence of the lower brominated compounds which are more soluble, more bio-accumulative and more toxic.

6 Environmentally sound disposal methods

Disposal of BDE containing materials in Europe and the US is incineration (since the mid 90-ies incinerators include after-burning facilities to destroy dioxin like substances) and landfilling. Large commercial landfills have leachate treatment facilities including aerobic and anaerobic treatment.

In NZ, at the landfills visited for leachate sampling, the leachate is piped or road transported to the sewer system where it is blended (diluted) and treated as part of the sewage at the municipal waste water treatment plant. To our knowledge no analysis for BDE's is carried out on pre- and post treated leachate / sewage.

This study has (most likely for the first time) analysed BFR's in landfill leachate. As is presented in section 4.1.1 above the quantity of BDE's leaving a well constructed landfill is very small. We found that in the worst case scenario ('all leachate is from the older cell 1'), the Hampton downs landfill discharges only 12.5 gram of BFRs into the municipal sewage system. This is approximately equivalent to the release into the open environment of a 0.25 kg block plastic containing BDE at 5 % from a landfill cell that contains 222 million kg of plastics per year or 1 billionths of its volume per year.

This is clearly an infinitesimal volume from which it can be concluded that properly designed and managed landfills are a secure final depository of BDE-containing plastics.

Moreover it should be realised that the anaerobic treatment step in the municipal sewage treatment plant may in fact reduce the BFR loading to the environment even further. This should be further investigated in the future.

Municipal landfills are generally well managed in New Zealand and are routinely used to dispose of most of the non recycled waste generated in New Zealand, including waste plastics. The indicative finding from this study strongly suggests that landfilling can be considered an environmentally sound means to dispose of BDE-containing polymers / plastics.

7 Limitations of the study

The XRF was used as essentially a screening tool for the presence of BFRs but was also invaluable to help quantify the total amount of the various BDEs present in the consumer products when BDEs were the only brominated compounds present. While there is some positive evidence of a correlation between the total BDE calculated from the laboratory results and the XRF reading there are a number of assumptions made;

1. As discussed the XRF does not identify the actual BFRs yet if bromine was detected by the XRF it was assumed to be a BDE unless the laboratory analysis stated otherwise. Hence for further study samples should be taken from all products that contain a BFR as identified by the XRF so as to ascertain if/which BDEs are present.
2. The quantity of bromine varies by mass between 65.8 % in tetrabromodiphenylether to 83.3% in decabromodiphenyl ether (75% mean value if equal amounts of the BDEs). Hence in calculating the total BDE concentration from the XRF value an averaged value was used and not the accurate values for the particular BDEs present. If laboratory analysis is carried out on all samples then there is no need to attempt to quantify the amount of BDE using the XRF.
3. While a large number of products were analysed with the XRF it was not feasible due to time constraints and the limitation of this study to analyse all the different models and types of product in all the different retail stores. In addition, almost all products tested showed different bromine levels in different parts even when these look similar As a result the XRF readings obtained are reflective of the kind of level of BDEs that are present but it is doubtful that it an accurate figure. Obviously with more time a much greater range can be analysed and the level of accuracy would be improved.
4. The % composition of the various BDE's present in commercial grade penta, octa and deca BDE vary significantly with time of production and by manufacturer and thus unless each plastic is analysed for all the different BDEs (209) an accurate value of the total BDE is difficult to attain. Obviously the larger the number of BDEs tested for the closer the total value will be to the actual value.

The mass estimation of the plastic components

Unless each product is destroyed so that an exact mass of the plastic that contains the BDE can be measured, one can usually only estimate the approximate mass. If this study were to be extended then the plastic content of each item could be researched by XRF analysis or obtained directly from the manufacturer especially in dealing with the more expensive items.

Estimation of the BDE flows for imports and exports

A large number of categories were identified and the quantities of imports and exports were investigated using New Zealand Statistics data since 1988. However due to time constraints the list is by no means complete. While a significant number of BDE containing products have been investigated for a more accurate determination of the total BDE flows into and out of New Zealand a much more thorough interrogation of the NZ Statistics database is required.

Industrial and Commercial products

The XRF analysis was solely restricted to consumer products focusing on the contents of New Zealand households rather than the commercial and industrial sector. For example, many hospitals, nursing homes, schools, cinemas and commercial offices are believed to have flame retardants in their upholstery and/or curtains yet these have not been analysed. Neither has the transport industry (airports, trains, busses) been analysed nor the fire departments.

Non-bromine containing consumer products may still be 'unsafe' as other new POP's like PFOS may be present. As sampling and collection will be similar these compounds should be included in any future BFR investigation.

8 Conclusions and Recommendations

1. Compiling an inventory of products containing brominated flame retardants imported, in-use, exported and disposed of in New Zealand is feasible.

2. Given adequate resources the inventory could be reasonably accurate. The current investigation and volumes estimated should be seen as a first approach.

3. It is recommended that the findings of this study be validated for commercial and industrial goods and a wider range of consumer product categories.

4. The information reviewed about the fate and transport of BDEs indicates that highly brominated BDE species (e.g. deca) break down in the environment to lower brominated species having bioaccumulative and toxic characteristics.

5. Landfilling in the New Zealand situation is a well developed and controlled activity and is the means used routinely to dispose of most of the non recycled waste generated in New Zealand, including waste plastics. Compared to the quantities of BDE-containing polymers / plastics disposed to (stored in) landfills, the quantity of BDEs leaving the landfill in leachate is infinitesimal. The very low levels of BDEs detected in the leachate of the landfills tested are regarded as de minimis. Landfilling in secure landfills is therefore supported as an environmentally sound way to dispose of BDE-containing polymers / plastics.

6. It is recommended that the landfill BDE leachate findings of this study be validated for the three landfills tested and for a representative sample of other landfills.

Additional readings

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Appendix A Detailed data tables

Table 15 Estimated Annual BDE Flows in New Zealand

Annual Totals (tonnes)

	End Use						
	Imported in finished goods	Used in NZ made products	Exports Total	In-Use	Entering Landfill	Cum'tve landfill total	Being Recycled
1990	46	5	117	137	14	49	-
1991	54	5	111	195	20	68	-
1992	59	7	141	262	20	88	-
1993	58	9	227	328	20	108	-
1994	117	24	231	464	25	133	-
1995	123	23	256	603	30	163	0
1996	128	23	237	732	48	211	0
1997	118	22	314	843	29	240	0
1998	98	24	314	920	45	285	0
1999	118	28	507	996	69	354	1
2000	122	26	427	1,040	104	458	1
2001	101	26	441	1,062	105	563	1
2002	128	27	414	1,025	191	754	1
2003	161	28	544	1,035	179	933	1
2004	152	16	262	1,075	117	1,049	12
2005	161	17	295	1,111	129	1,178	13
2006	155	15	330	1,143	125	1,304	12
2007	92	15	279	1,095	141	1,445	14
2008	81	15	267	908	257	1,702	26
2009	66	12	266	723	238	1,940	25

Table 16 Imports of Polymers in Primary Form for New Zealand based manufacturing

Total Imports of plastic resin for manufacturing, All Countries (Tonnes)

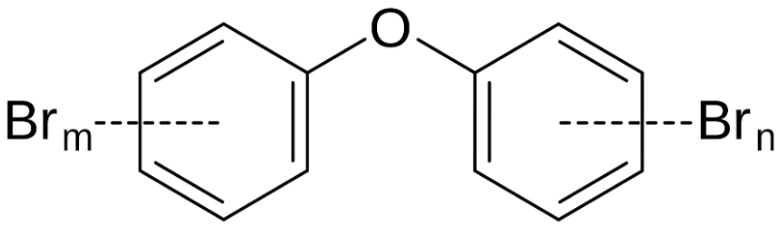
	PP	PVC	EPS	OTHER	L/LLDPE
Tonnes	Propylene, other olefin polymers	PVC & other halogenated olefin polymers	Styrene polymers; expansible polystyrene	SAN, ABS, ABS, PMMA, POM, PC, NYLON	LLDPE, LD/LLDPE/ LDPE
1988	759	996	136	207	-
1989	436	1,300	113	339	-
1990	452	911	114	338	-
1991	463	666	94	410	-
1992	604	1,205	95	638	-
1993	654	982	131	805	8
1994	1,694	2,367	321	1,939	93
1995	1,619	2,456	367	1,777	119
1996	1,692	2,244	370	1,806	97
1997	1,661	2,482	348	1,791	77
1998	1,684	2,330	389	1,971	59
1999	1,997	2,812	477	2,218	69
2000	1,837	2,113	398	2,124	88
2001	2,038	2,432	429	2,168	231
2002	2,276	2,452	548	2,198	253
2003	2,359	2,475	522	2,429	162
2004	522	882	183	539	577
2005	648	870	160	510	1,147
2006	594	804	166	432	1,096
2007	613	725	169	438	1,235
2008	555	763	188	424	946
2009	594	551	127	356	874

Table 17 Description of Imported Polymer Resins

Polymer Resin	Example Customs Code	Description
PP	3902100000	Propylene, other olefin polymers; polypropylene in primary forms
Poly-Isobutylene	3902200000	Propylene, other olefin polymers; polyisobutylene in primary forms
PP Co Polymer	3902300000	Propylene, other olefin polymers; propylene copolymers in primary forms
PVC	3904100000	Vinyl chloride, other halogenated olefin polymers; poly(vinyl chloride), not mixed with any other substances, in primary forms
EPS	3903110000	Styrene polymers; expansible polystyrene, in primary forms
SAN	3903200000	Styrene polymers; styrene-acrylonitrile (SAN) copolymers, in primary forms
ABS	3903300001	Styrene polymers; acrylonitrile-butadiene-styrene (ABS) copolymers, in primary forms, not mixed with any other substance
ABS Components	3903300009	Styrene polymers; acrylonitrile-butadiene-styrene (ABS) copolymers, in primary forms, mixed with any other substance
PMMA	3906900901	Acrylic polymers; in primary forms, (excluding polymethyl methacrylate), (not liquids or pastes), acrylic copolymers
PCM	3907100100	Polyacetals; in primary forms, blocks of irregular shape, lumps, powders (including moulding powders), granules, flakes and similar bulk forms
POM	3907600100	Poly(ethylene terephthalate); in primary forms, blocks of irregular shape, lumps, powders (including moulding powders), granules, flakes and s
PC	3908100100	Polyamides; polyamide-6, -11, -12, -6,6, -6,9, -6,10 or -6,12, in primary forms, blocks of irregular shape, lumps, powders (including moulding
NYLON	3901300900	Ethylene polymers; in primary forms, ethylene-vinyl acetate copolymers, other than liquids and pastes
LLDPE	3901100001	Ethylene polymers; in primary forms, polyethylene having a specific gravity of less than 0.94, ground polyethylene, rotational moulding grade
LLDPE	3901100005	Ethylene polymers; in primary forms, having a specific gravity of less than 0.94, (other than ground polyethylene, rotational moulding grade),
LLDPE	3901100010	Ethylene polymers; in primary forms, polyethylene having a specific gravity of less than 0.94, (other than ground polyethylene, rotational moulding grade)

Appendix B Polybrominated Diphenyl Ether (PBDE) structure and physical properties

The flame retardancy of polybrominated diphenyl ethers (PBDEs) increases with the number of bromine atoms in the molecule. Therefore only the higher brominated BDEs like Penta, Octa or Deca are of commercial interest.
The general chemical formula of polybrominated diphenyl ethers is:



PBDEs have many congeners depending on the number and position of the bromine atoms on the two phenyl rings. The total possible number of congeners is 209, and the number of isomers for mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, octa-, nona- and deca BDE are: 3, 12, 24, 42, 46, 42, 24, 3 and 1, respectively.

PBDEs are produced by the bromination of diphenyl ether. Technical OBDE may be produced by the reaction of diphenyl ether with eight equivalents of bromine in the presence of Al_2Cl_6/Al_2Br_6 first at 35 ^{o}C and then at 120 ^{i}C. Technical PeBDE is synthesized by treating diphenyl ether with five equivalents of bromine at 30-65 ^{i}C in the presence of powdered iron.

Commercial or technical grade PBDEs are generally mixtures which are in part a result of the production process (impurities). For example, HexaBDE is not purposefully produced, but almost always as a by-product of the Penta or Octa BDE production. The compositions of commercial BDEs are given in table 1 below.

Table 18 Composition of commercial brominated diphenyl ethers[15]

Product	*Composition*								
	PBDE[a]	TrBDE	TeBDE	PeBDE	HxBDE	HpBDE	OBDE	NBDE	DeBDE
			BDE-47						
DeBDE								0.3-3%	97-98%
OBDE					10-12%	43-44%	31-35%	9-11%	0-1%
PeBDE		0-1%	24-38%	50-62%	4-8%				
TeBDE[b]	7.6%	--	41-41.7%	44.4-45%	6-7%				

[a] Unknown structure.
[b] No longer commercially produced. Analysis of one single sample.

[15] IPCS InChem, International Programme on Chemical Safety (UNEP-WHO), Environmental Health Criteria no. 162, by Dr. G.J van Esch, Bilthoven, Netherlands, published Geneva 1994, Brominated Diphenyl Ethers, http://www.inchem.org/documents/ehc/ehc/ehc162.htm#SectionNumber:2.2

However there are many variations like[16]:

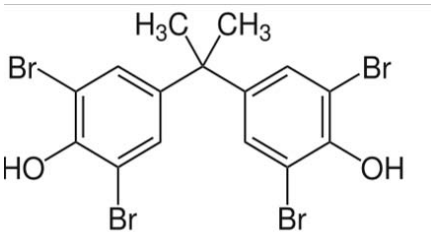
Table 19 Commercial PeBDE Bromkal 70-5DE

Product	Composition								
	PBDE[a]	TrBDE	TeBDE	PeBDE	PeBDE	HeBDE	OBDE	NBDE	DeBDE
			2,2',4,4'	2,2',4,4',5	2,2',4,4',6	2,2',4,4',5,5'			
			BDE-47	BDE-99	BDE-100	BDE-137			
PeBDE			37%	35%	6.8%	2.5%			

Table 20 Commercial OBDE DE-79

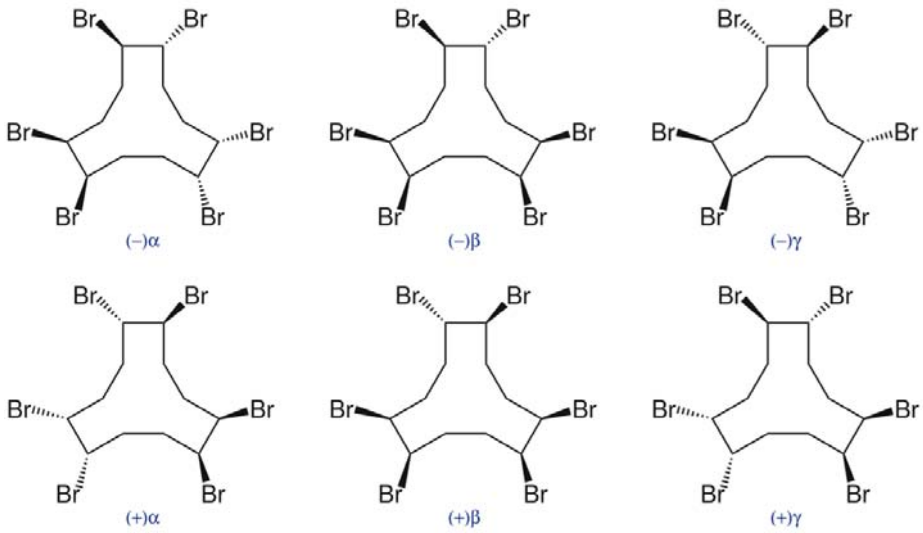
Product	Composition							
	PBDE[a]	TrBDE	TeBDE	PeBDE and HeBDE	HpBDE	OBDE	NBDE	DeBDE
PeBDE				11 %	44%	31%	10%	0.5%

Commercial DeBDE was the most widely used flame retardant in the world in 2001[2]with OBDE being the second most widely used (largely in acrylinitrile-butadiene-styrene (ABS) polymer (12 – 18% by weight) in computer and other business machine cases / cabinets. However, OBDE is being phased out and replaced by tetrabromobisphenol (TBBP-A) as this is stable in UV light, while OBDE is not.



Another advantage is that TBBP-A is chemically bonded to the polymers while PBDEs are just physical blends. During abrasion or corrosion of the polymers PBDEs escape more readily to the environment while TBBP-A will still be bonded to the polymers. It is mainly used in printed circuit boards and in ABS which is used in TV's.

Another 'more modern' brominated flame retardant is hexabromocyclododecane (HBCD) which has 16 stereo isomers of which the most common are:



HBCD is mostly used in Extruded (XPS) and expanded (EPS) polysterene at resp 0.7 and 2.5%[17]

[16] TOXICOLOGICAL SUMMARY FOR SELECTED POLYBROMINATED DIPHENYL ETHERS Integrated Laboratory Systems B.L.Carson, 03-2001 , http://ntp.niehs.nih.gov/ntp/htdocs/Chem_Background/ExSumPdf/PBDEs.pdf
[17] HBCD Wikipedia: http://en.wikipedia.org/wiki/HBCD

Table 21 Average Properties of brominated diphenylethers (interpolated)

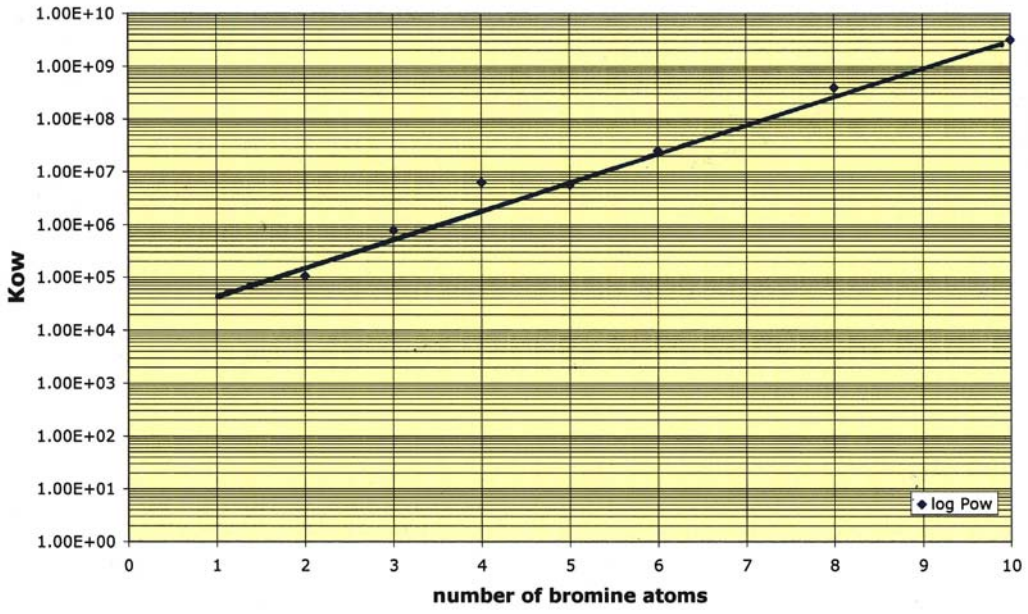
Number of bromine atoms	Vapour pressure Pa at 25°C	Water solubility µg/L at 21°C	Octanol/water distribution coefficient log Pow	Log BAF*
1		4000	3.6	2.7
2	2	500	5.1	5.2
3	$2\ 10^{-2}$	90	5.9	6.1
4	$4\ 10^{-4}$	20	6.3	6.7
5	$3\ 10^{-5}$	5	6.8	7.0
6	$9\ 10^{-6}$	2	7.3	7.1
7	$5\ 10^{-6}$	0.7	7.9	7.9
8	$4\ 10^{-6}$	0.3	8.5	6.9
9	$3\ 10^{-6}$	0.16	9.0	6.6
10	$2.6\ 10^{-6}$	0.10	9.5	6.1

* for upper trophic level

Physical properties

A few physical properties of BDEs are presented below in the form of graphs, called homologe series, to show the relationship between the various compounds and their dependancy on their molecular make up.

Figure 6 Octanol-water distribution coefficients of brominated diphenylethers: Kow



In Figure B.1 the octanol – water partitioning coefficient is shown in relation to the number of bromine atoms. Clearly the higher the bromination the higher the affinity of the compound to reside in the octanol phase. Among other things this explains the very low solubility of BDEs in water.

This is shown in Figure B.2 where clearly the higher brominated compounds display a lower solubility. Note the scale is logaritmic. The much higher solubility underlies the higher toxicity of the lower brominated coumpounds. Unfortunately, as is described later in this report, the higher brominated coumpounds degrade in the environment into the lower brominated compounds.

Figure 7 Water solubility of brominated diphenylethers at 21 °C ng/L

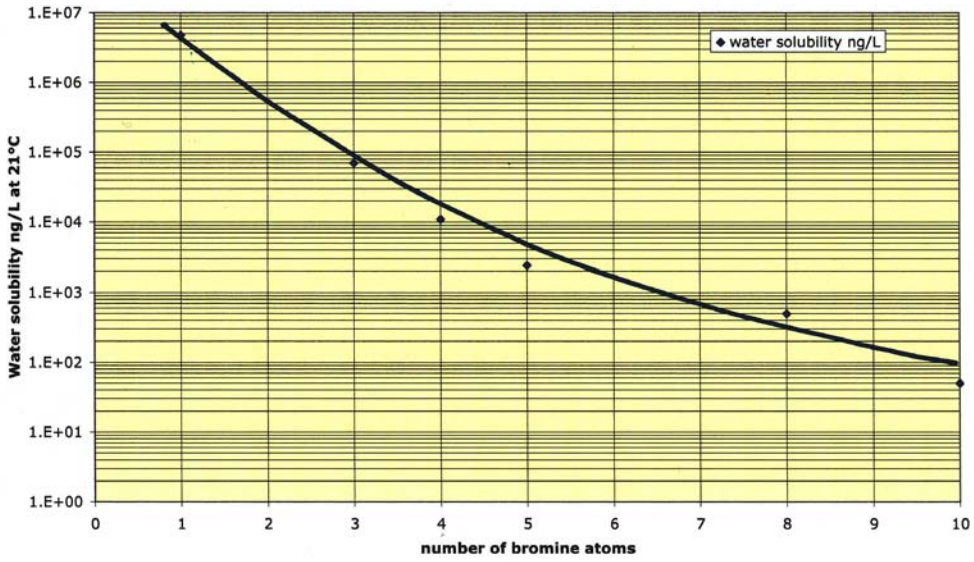
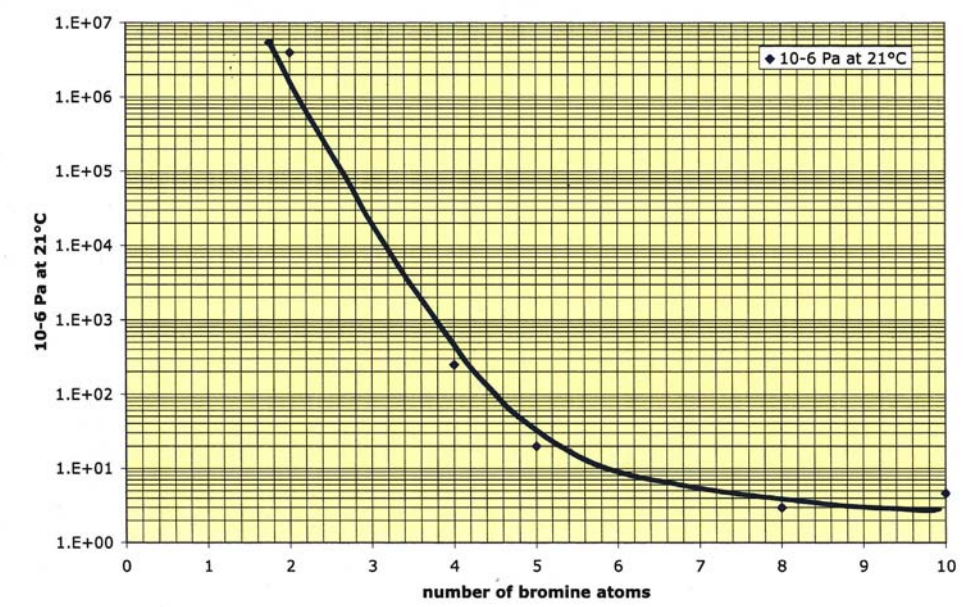


Figure B.3 shows the vapour pressure, or the ease of evaporation. At bromination of 5 bromine atoms and higher the vapour pressures are very low, at 10^{-5} to 10^{-6} Pascal at 21 °C. This means the BDE's used as flame retardants are unlikely to evaporate quickly at room temperature and equally unlikely to evaporate out of landfills. However at higher temperatures (during a fire) they do evaporate and fall apart releasing free bromine which binds with the combustible materials before oxygen can and thereby extinguishing the fire.

Figure 8 Vapour pressures of brominated diphenylethers: E-6 Pa at 25 °C



Commercial Brominated diphenylethers (BDE's)

The commercial BDEs have their own CAS (Chemical Abstract Services) identification number which sets them apart from the individual congeners. In time, due to changing production processes the composition has changed. Some manufacturers also produce different blends.

Table 22 Composition of various commercial BDEs

	CAS No								
Commercial BDE		Tri-BDE's	Tetra-BDE's	Penta BDE's	Hexa-BDE's	Hepta BDE's	Octa-BDE's	Nona-BDE's	Deca-BDE
Mono-BDE's									
Di-BDE's									
Tri-BDE's*	49690-94-0								
Tetra-BDE's*	40088-47-9								
Penta-BDE's	32534-81-9	<1%	24-38%	50-70%	4-10%	<1%			
Hexa-BDE's*	36483-60-0								
Hepta-BDE's*	68928-80-3								
Octa-BDE's	32536-52-0			10-12%	<4%	44-45%	31-36%	9-11%	<1%
Nona-BDE's*	63936-56-1								
Deca-BDE	1163-19-5						(1%[b]); traces	(22%[b]) 3%	(77%[b]) >97%

* These poly-BDE's are not produced as individual flame retardants, but are by-products of the fabrication process

[b] Older deca-BDE formulation no longer commercialised

Appendix C Analytical equipment and procedures

During the project it has become clear that a portable X-Ray Fluorescence (XRF) analyser has the required sensitivity to detect bromine present in the BDE's at levels common in polymers.

The X-ray fluorescence principle is depicted in the figure on the right[18]. An inner shell electron is exited by an incident photon in the X-ray region. During the de-excitation process an electron is moving from a higher energy level to fill the vacancy created by the ejection. The energy difference between the two shells appears as an X-ray emitted by the atom. The X-ray spectrum acquired by the instruments detector during this process reveals a number of characteristic peaks. The X-ray frequency identifies the elements in the sample, while the energy of each peak identifies the quantity of that element present.

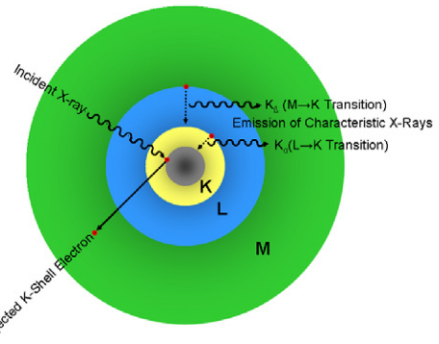


Figure 9. X-ray fluorescence principle

The XRF analysers have the advantage of being non-destructive, multi-element, fast and cost-effective. It also provides a fairly uniform detection limit across a large portion of the periodic table for elements heavier than fluoride and is applicable to a wide range of concentrations from 100% to a few parts per million. Another advantage is that the detector has no 'memory', i.e. samples with very low concentrations can be analysed immediately after a sample with a very high concentration which would be impossible using a gas chromatograph for example.

Bromine constitutes up to 80% of the BDE weight and flame retardants are often used in a concentration of 0.1 – 30% of the final polymer. Therefore a hand held XRF analyser with a detection limit of 10 ppm (0.001 %) has the required sensitivity to detect brominated compounds in the polymers. A small drawback is that an operator will need a licence from the National Radiation Laboratory to operate a XRF analyser.

Another analytical instrument is an ion-attachment mass spectrometer (IAMS). The principle is shown in the figure on the right[19] This is a form of mass spectrometry that uses a "soft" form of ionization similar to chemical ionization in which a cation is attached to the analyte molecule in a reactive collision: $M + X^+ X A \rightarrow MX^+ + A$ where M is the analyte molecule, X+ is the cation and A is a non-reacting collision partner. As cation an alkali element is used such as sodium[20] or lithium.

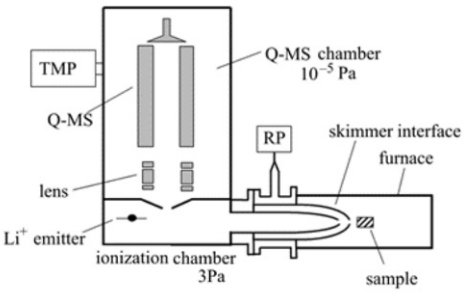


Figure 10. Schematic diagram of the prototype instrument TIAS-254 with IAMS

[18] From: http://stephenson-associates-inc.com/XRF%20Basic%20Principles.pdf
[19] Figure from: http://www.springerlink.com/content/m262300144284807/
[20] http://sciencelinks.jp/j-east/article/200219/000020021902A0079892.php

Currently, IAMS is used industrially to verify, with a high throughput, the concentrations of brominated flame retardants (BFR) in plastics in compliance with European RoHS (Restriction of Hazardous Substances) regulation in place since 2006. The banned molecules include PBB and PBDE, whose concentration should not exceed 0.1% w/w[21] IAMS was originally developed by Prof. Toshihiro FUJII[22]

Figure 11 IAMS analyser prototype

BFR analysis in water requires far lower detection limits, however as is shown in section 2 above bromine present in leachate can be analysed when concentrated. This can be on filter paper where all small particulates with adsorbed bromine containing compounds or in a solid phase extraction gel which adsorbs non-polar organic compounds. At high enough concentration and sufficiently concentrated the bromine can be detected using XRF or IAMS analysis.

However to distinguish between all different types of BFRs far more complex analysis is required. A wide range of methods to determine residues of PBDE in various media (air, sewage sludge, sediment, human adipose tissue, marine organisms, fish, and feed) have been developed. In general the samples are extracted using common solvents like hexane, acetone, chloroform or methylene chloride, however, sometimes the extraction fluid needs to be more exotic like hot concentrated sulphuric acid, tetrahydrofuran or potassium oxalate/ethanol/diethyl ether/pentane.

The extraction is followed by a clean-up phase, often on Florisil, followed by quantification by GC/MS (Gas Chromatography/Mass Spectroscopy), HPLC (High Pressure Liquid Chromatography), GC/MS-SIM/NCI (Selective Ion Monitoring / Negative Chemical Ionisation), LC/MS (Liquid Chromatography), HRGC/HRMS (High Resolution Gas Chromatography/High Resolution Mass Spectroscopy), GPC (Gel Permeation Chromatography), etc.

All of these require high quality standards and for many of the brominated flame retardants these are not available for every congener or isomer.

[21] http://en.wikipedia.org/wiki/IA-Mass
[22] http://www.hino.meisei-u.ac.jp/rikouken/lab/chem/fujii_toshihiro.html

Appendix D Certificate of analysis

The Institute for Reference Materials and Measurements in Belgium provides European reference Materials just like the National Institute of Standards and Technology (NIST) does in the US. In this study we have used two of the polymer samples (polyethylene) to calibrate the Bromine analysis carried out with the XRF analyser. These standards were provided by Sietronics Pty Ltd located in Canberra, Australia. Despite being past their validity date we have assumed the standards consisting of plastic granules enclosed in a Nylon / Mylar housing would not lose their bromine contents.

Institute for Reference Materials and Measurements

ERM European Reference Materials

CERTIFICATE OF ANALYSIS

ERM®- EC681

POLYETHYLENE

Parameter	Mass fraction	
	Certified value [1] mg / kg	Uncertainty [2] mg / kg
As	3.93	0.15
Br	98	5
Cd	21.7	0.7
Cl	92.9	2.8
Cr	17.7	0.6
Hg	4.50	0.15
Pb	13.8	0.7
S	78	17

1) Certified values are unweighted means of 4 to 24 data sets. Certified values represent total contents. Certified values are traceable to SI.

2) Estimated expanded uncertainty *U* with a coverage factor *k*=2, corresponding to a level of confidence of about 95 %, as defined in the Guide to the Expression of Uncertainty in Measurement (GUM), ISO, 1995. Uncertainty contributions arising from characterisation as well as from homogeneity and stability assessment were taken into consideration.

This certificate is valid until 1/2009; this validity may be extended as further evidence of stability becomes available.

The minimum sample intake is 600 mg.

NOTE

European Reference Material ERM®-EC681 was originally certified as BCR-681. It was produced and certified under the responsibility of the IRMM according to the principles laid down in the technical guidelines of the European Reference Materials® co-operation agreement between BAM-IRMM-LGC. Information on these guidelines is available on the Internet (http://www.erm-crm.org).

Accepted as an ERM®, Geel, May 2004
shelf life prolonged August 2005

Signed:

Prof. Dr. Hendrik Emons
Unit for Reference Materials
EC-DG JRC-IRMM
Retieseweg 111
2440 Geel, Belgium

All following pages are an integral part of the certificate.

Institute for Reference Materials and Measurements

ERM European Reference Materials

CERTIFICATE OF ANALYSIS

ERM®- EC680

POLYETHYLENE		
Parameter	Mass fraction	
	Certified value [1] mg / kg	Uncertainty [2] mg / kg
As	30.9	0.7
Br	808	19
Cd	140.8	2.5
Cl	810	16
Cr	114.6	2.6
Hg	25.3	1.0
Pb	107.6	2.8
S	$0.67 \cdot 10^3$	$0.07 \cdot 10^3$

1) Certified values are unweighted means of 4 to 25 data sets. Certified values represent total contents. Certified values are traceable to SI.

2) Estimated expanded uncertainty U with a coverage factor k=2, corresponding to a level of confidence of about 95 %, as defined in the Guide to the Expression of Uncertainty in Measurement (GUM), ISO, 1995. Uncertainty contributions arising from characterisation as well as from homogeneity and stability assessment were taken into consideration.

This certificate is valid until 1/2009; this validity may be extended as further evidence of stability becomes available.

The minimum sample intake is 500 mg.

NOTE

European Reference Material ERM®-EC680 was originally certified as BCR-680. It was produced and certified under the responsibility of the IRMM according to the principles laid down in the technical guidelines of the European Reference Materials® co-operation agreement between BAM-IRMM-LGC. Information on these guidelines is available on the Internet (http://www.erm-crm.org).

Accepted as an ERM®, Geel, May 2004
shelf life prolonged August 2005

Signed:

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All following pages are an integral part of the certificate.

Appendix E Methods and analysis of consumer products

Methodology

Unfortunately the XRF analyser does not identify the type of bromine present within the compound nor the compound itself. So while it serves as a useful tool for the presence of bromine it does not indicate whether the bromine is due to a brominated flame retardant (BFR) or some other bromine compound. Furthermore, the fact that this study is limited to polybrominated diphenyl ethers (PBDE) means that even if we assume that the XRF reading is in fact due to a brominated flame retardant (an acceptable assumption) it does not mean it is a BDE. The bromine reading can be caused by other polybrominated flame retardants such as hexabromocyclododecane (HBCDD or HBCD) or Tetrabromobisphenol A (TBBPA) or any of the other 75 lesser used brominated flame retardants.

However by using the concentration of individual BDEs obtained from laboratory analysis the XRF analysis results can be used to estimate a rough quantity of potential BDEs within the consumer product. The chemical analysis undertaken by the Institute for Environmental Studies of the Free University in Amsterdam, Holland, was used to identify the type and quantity of different congeners of the various brominated diphenyl ethers.

A review of literature of the type of products that contain BDEs identified a number of categories that needed to be investigated. BDE's are prevalent in electrical and electronic equipment (TV, stereos, computers, printers, faxes, switches, plugs), household appliances (electrical heaters, hairdryers, hair tongs, dishwashers, fridges, kettles, toasters), furniture and upholstery (curtains, drapes, car interiors) and flooring materials (carpet, underlay). The testing was not solely limited to these products but a limitation of this study meant that due to time constraints the focus had to remain on these items. Seven major retail firms and a large car recycling company kindly agreed to the testing of these articles.

Analysis of Consumer products

In Table E.1 the consumer product that contained the greatest percentage of bromine are listed for reference. Obviously the highest percentage of bromine present does not necessarily mean that it contains the largest total amount of bromine. The total bromine is dependent on the type of BDE and the total weight of the plastic component containing the BDE.

Consumer Product	Part containing Br	XRF – reading ppm (mg/kg)	Approx % bromine content by Mass[23]
Hair dryer	Body	250174	25.0
Stereo CD player	Body	182548	18.3
Widescreen TV (retest value)	Back cover	172866	17.3
Multi-plug / power board	Body	152957	15.3
Fax machine	Thermal cover	99697	10.0
Oil heater	Plastic stand and controls	92961	9.3
Computer	Printed circuit board	89901	9.0
Iron	Handle and body	86332	8.6
Energy saving light	Plastic holder	56011	5.6
Dishwasher	External panels	33987	3.4

Table 23. The 'top ten' of the consumer products tested containing the largest concentration of Bromine

As can be seen from the table the greatest values that were recorded by the XRF analyser were not on plastics that are in direct or close contact or to sources of significant heat. Interestingly, the levels of BFRs found in all types of power tools were much lower than expected. The tools tested ranged from hammer drills, circular saws, angle grinders and even heat guns for paint stripping, yet little or no BFRs were found.

Historically BFRs have been more prevalent when flame retardants were mandatory particularly in flooring, upholstery and curtains, in certain countries such as the UK (The Furniture and Furnishings (Fire) (Safety) Regulations 1988). Consequently 3 households were targeted that contained a variety of these products and importantly where the date of origin was known to be from different periods over the last 20 years. Surprisingly no brominated flame retardants appeared to be present in any of these items.

[23] Note that the bromine content can relate to a variety of bromine compounds, not all flame retardants but most would fall in this group. Within the group of flame retardant many would contain more modern flame retardants, TBBP-A or non halogenated flame retardants (likely more the imports from the EU).

Similarly the amount of BFRs present in upholstery was much less than expected. None was found in furniture manufactured from Europe, only a very small amount from NZ made furniture mainly from the fabric (manufactured overseas) rather than the foam. Slightly larger amounts were found on occasions from imported furniture from Asia but still less than 0.1%, the current legal limit for goods produced in the EU.

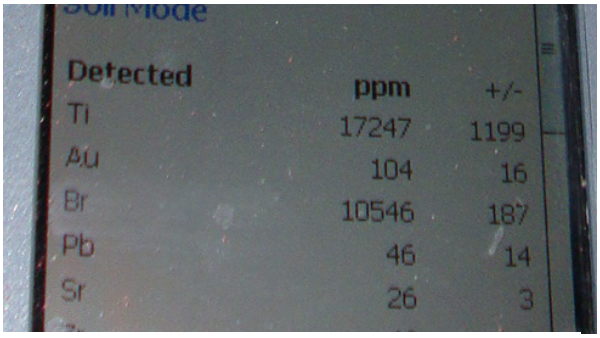
At the car recyclers a variety of cars were tested that varied from the early 80's to the mid 90's.

Manufacturers included Japanese (Toyota Corolla/Camry/Subaru Legacy), European (BMW), and Australian (GM Holden). On only a few occasions were BFRs found and this was limited to the interior hood lining of a Toyota Corolla late 80's, interior side panel of a Mazda Astina 1992 and a seat of a Toyota Camry 1996. No bromine was detected in any other parts made from polymers.

As mentioned above BFRs were not found in any of the retail flooring outlets including; carpets, rugs or foam underlay. Most of the foam carpet underlay is manufactured by Dunlop® in New Zealand. Since they do not use BFRs for this product (personal communication) these findings confirm this.

A number of children's clothes, footwear and toys particularly for the 0-5 year age group were tested. There was very limited presence of BFR with a maximum of 0.04% bromine being recorded. The only exception to this was children's boaster car seats (0.27% Bromine) and bean bag refills (0.32% Bromine). Both of these are made from expanded polystyrene (EPS) like the under floor insulation material Expol® (0.39% Bromine). The brominated flame retardant used in modern EPS is not a polyBDE but is in fact hexabromocyclododecane (personal communication with the technical director of Expol). This is confirmed by the laboratory analysis that shows the absence of BDEs and presence of HBCD.

On several occasions plastics used in the manufacture, processing and packaging of food were tested and as to be expected no BFRs were present.



Display of XRF analyser showing the bromine concentration of a wall switch (Mitre 10)

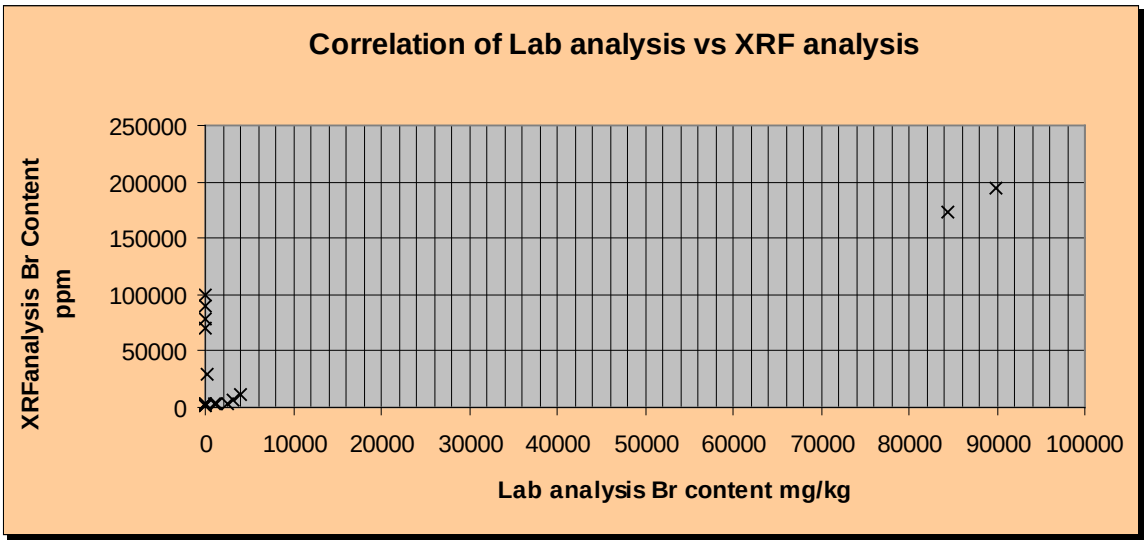
The limit of detection of the XRF analyser used is 10 ppm for bromine. This is well below the normal application rate of BFR's. Calibrating the XRF for bromine is carried out prior to each test series, immediately after start-up, on two European Reference Materials (ERM).

Appendix F Calculating the % BDE present in consumer products

The steps below describe the methodology of how the concentration in mg/kg of BDE found from the laboratory analysis of a selection of plastic samples were used to give a % BDE value for any plastic tested using the XRF.

1. The concentration of individual BDEs from lab analysis was converted into the concentration of bromine for that BDE by multiplying the % by mass of bromine (using molar masses) that is present in each of the BDEs. Thus the mg/kg value for each BDE is converted to a mg/kg of bromine value.
2. The total bromine present in the plastic is found by totalling the amount of bromine found in each of the different congeners for every BDE. The other BFRs present in the lab analysis such as HBCD, TBBP-A or the unknown were treated in the same way.
3. This calculated total bromine content should be directly related to the XRF value for that product. As can be seen from the results in Figure 2 (below) the correlation between the total bromine content in the laboratory analysis and the XRF analyser is not conclusive. Out of the sixteen plastics analysed 7 samples (BFR 1, 5, 6, 10, 11, 14, and 16) had 'similar' levels of bromine in both XRF and laboratory analysis. However, in the rest of the samples (BFR 2, 3, 4, 7, 8, 9, 12, 13, 15) negligible quantities of bromine were found in the laboratory analysis whereas significant quantities were identified by the XRF analyser. Establishing a correlation factor between the laboratory analysis and the XRF analyser is problematic with such limited and inconclusive data. However it was decided that those laboratory analysis that did not reveal any BDEs were treated as anomalous and were discarded. For example, sample BFR 2 a printed circuit board (5-10 yrs old) is known typically to contain quite high bromine as much as 20 % by weight (usually Tetrabromobisphenol A, TBBPA) yet the laboratory analysis reveals only 1 mg/kg. Obviously considerably more testing is required to establish the large discrepancy between some of the data obtained from the laboratory and the XRF analysis. Regardless of the cause it was deemed more prudent to be conservative and assume that either the laboratory extraction of the BDE from the plastic was incomplete or more likely the fact that the BDEs present in the plastic were different from the 21 BDE's tested for by the laboratory analysis (There are 209 BDEs in total). This assumption does of course mean that the estimation of the BDE content in consumer products could be higher than the actual content.
4. The correlation factor was calculated by comparing the total of all the BDEs from the laboratory analysis from samples BFR 1, 10, 11, 14, and 16 (178,497 mg/kg) and comparing the corresponding total from the XRF analysis (384,520 mg/kg). This gives a correlation factor of 0.5 i.e. the laboratory analysis gives half the value of the XRF analyser. Samples BFR 5 and 6 were not included as these samples were expanded polystyrene and were known to contain hexabromododecane (HBCD).
5. If one assumes that the samples sent for laboratory analysis is a reflection of the types of plastics that are being used in the consumer products (which is a fair assumption) then the average of total BDE present in the consumer products can be found by multiplying the XRF value obtained by the 0.5 correlation factor.

Graph 2 **The correlation of laboratory analysis (mg/Kg) against the XRF analyser readings (mg/Kg)**



In Graph 2 the 4 samples near (0 ; 0) have low to medium levels of HBCD and penta-BDE while the two samples near the (90,000 ; 170,000) coordinate have very high deca-DBE levels.

Laboratory analysis 'only' determined 26 brominated compounds and identified some 'unknown' compounds, while there are over 300 brominated compounds either in use or associated with the production of BFRs, many of which will not come through the sample clean-up process. This explains the cluster of samples on the "0" mark for lab analysis Br content while the XRF analysis shows bromine present. To identify these compounds a more elaborate lab analysis would be needed.

The analytical results of the laboratory analysis are provided on the next page. The yellow highlighted sections indicate the 'unknown peaks' found in the chromatograms. The laboratory while they could not identify the unknowns, their concentration could be estimated as a multiple of the deca BDE peak (BDE209). Thus sample BFR16 (the CD stereo) has an unknown with an approximate concentration of twice the deca BDE (approx 2700 mg/kg).

Table 24 below summarises the 800 analyses taken of the various consumer products. The XRF % BDE is a weighted average figure that gives the likely percentage present in the various categories of consumer goods investigated. The correlation factor for the various consumer goods is applied to the NZ statistics database to establish the annual BDE flows in New Zealand.

Table 24. % BDE present in imported consumer goods

	Imported Consumer Goods	XRF %BDE	XRF/Analysis Corr (0.5)
1	Auto interior	0.069%	0.034%
2	Auto parts	0.012%	0.006%
3	Beds/bedding	0.014%	0.007%
4	Building materials	0.020%	0.010%
5	Bulb holder	1.674%	0.837%
6	Carpet/flooring	0.007%	0.004%
7	CD player	0.786%	0.393%
8	Clothes	0.004%	0.002%
9	Computer Equipment	0.887%	0.444%
10	Dishwasher	0.684%	0.342%
11	Electrical other	0.045%	0.023%
12	Electrical plugs	0.317%	0.159%
13	Fan heater	5.502%	2.751%
14	Fridge/Freezer	0.084%	0.042%
15	Floor insulation	0.376%	0.188%
16	Furniture other	0.023%	0.012%
17	Hair dryer	3.813%	1.907%
18	Irons/ironing boards	0.001%	0.000%
19	Kettles	0.298%	0.149%
20	Laptop transformer	0.362%	0.181%
21	Lighting equip	1.377%	0.689%
22	Miscellaneous	0.001%	0.000%
23	Oil heater	0.986%	0.493%
24	Other home appliances	0.002%	0.001%
25	Other kitchen appliances	0.006%	0.003%
26	Oven/grills	0.092%	0.046%
27	Power board	9.698%	4.849%
28	Power tools	0.026%	0.013%
29	PS refill	0.228%	0.114%
30	Sofa	0.058%	0.029%
31	Soft furnishings	0.010%	0.005%
32	Stereo	0.862%	0.431%
33	Switches	0.148%	0.074%
34	Thermal heater	5.408%	2.704%
35	Toaster	0.024%	0.012%
36	Toys	0.007%	0.003%
37	TV	5.155%	2.578%

Appendix G Details of the selected landfills and the sampling of leachate

Hampton Downs has been selected as an example of a recent landfill which has received waste over a short period (2005 – 2009) from municipal and commercial / industrial sources (30%). Cell 1 has been closed in 2009 after 4 years of operation and capped with 2 meters of compacted clay.

Cell 1 Hampton Downs under construction in 2005 (photo ref. EnviroWaste)

Cell 1 leachate is transported in underground pipes to collector wells where it is mixed with the leachate from the newer cells. The combined leachate is pumped from the collector wells to above ground storage tanks. From these the leachate is transported by road tanker to Manukau where it is disposed of in the municipal sewer. On average 60,000 litres of leachate is transported off site each day.

Cell 1 leachate was sampled by the timely placement of the sampling bucket under the appropriate leachate pipe consistent with the pump cycle. (see pictures below).

Sampling leachate at Hampton Downs Landfill.

Taupo District Council Landfill located at Broadlands Rd has operated since about 1985 after the Wharawaka East and Mangakino landfills closed. The landfill mainly receives domestic waste plus some from the rural and small scale commercial sector.

Broadlands Road Landfill Taupo (ref. Google Maps).

Samples were collected directly from the landfill leachate pipeline. This underground pipeline discharges into a holding pond, however is normally closed. When the pond is emptied by suction truck the valve is opened to allow leachate into the pond.

Collection has been undertaken by placing the sampling bucket under the leachate pipe and opening the valve (see T handle in the foreground in the picture on the right).

Greenmount Landfill on Smales Road in East Tamaki, Auckland has operated for 25 years till 2005. It is one of the older landfills in New Zealand which accepted industrial / hazardous waste.

There are quite a number of leachate collection wells. During the site visit it was unclear which leads to what section of the landfill. The collector well which was most likely to contain an average mixture of leachate has been sampled. To open the well to allow sampling was a rather involved process, therefore no other wells could be inspected.

Appendix H Current status of the flame retardant industry[24]

SRI Consulting published a report on the current status of the Flame Retardant industry which can be purchased on their website. The summary is freely available on internet. We quote:

"The total market for flame retardants in the United States, Europe and Asia in 2007 amounted to about 1.8 million metric tons and was valued at $4.2-4.25 billion. This market is expected to grow at an average annual rate of about 3.7% per year on a volume basis over the 2007-2012 period.

Regulations and "Green" Procurement

The flame retardant market is affected by regulation in two countervailing ways. First, there are international, regional and national fire safety regulations and flammability standards for the flame retardancy of various products that are used by the construction, transportation, electrical and electronics industries. Fire safety requirements are becoming stricter globally because of the increasing use of plastics in a variety of consumer applications. Government regulations also affect chemical species that are deemed to have deleterious effects on the environment or human health. Flame retardant compounds, especially halogenated compounds and antimony trioxide, increasingly must deal with the second situation.

The flame retardant business has emerged as a result of requirements that manufacturers of plastics, textiles and other materials meet various safety standards and government regulations by improving the flame retardant characteristics of their products. Because most flame retardants contribute no other useful properties to a product (and often compromise other performance characteristics), their use is almost entirely driven by legislation and industry standards. Indeed, growth (or decline) in this business can often be impacted far more dramatically by new regulations than by growth in the end-use markets. Because many flame retardants (e.g., chlorinated hydrocarbons, brominated compounds) are subject to scrutiny either for their own toxicity or for that of their combustion products, current or potential health and environmental regulations are also important determinants of the specific types of flame retardant used. An understanding of current regulations and an awareness of potential new ones is an important requirement for success as a participant. The main new regulations concerning flame retardants include

- REACH, the new regulation for chemicals in the European Union, entered into force on June 1, 2007. Important milestones in the timeline for the implementation of REACH are
    - November 30, 2010—Registration deadline for substances in quantities of 1,000 metric tons and above, as well as carcinogens, mutagens and substances toxic to reproduction above one metric ton per year and substances classified as very toxic to aquatic organisms above 100 tons.
    - May 31, 2013—Registration deadline for substances in quantities of 100 metric tons and more.
    - May 31, 2018—Registration deadline for substances in quantities of one metric ton and more.

      Under the REACH regulation the European Chemicals Agency will require chemical producers to submit a plan to substitute safer alternatives for substances that are classified as dangerous or, if no alternative exists, an R&D plan to develop suitable replacements. REACH's duty of care obligations will affect the entire supply chain of

[24] Flame Retardants by Uwe Fink and Fred Hajduk and Hiroaki Mori and Wei Yang, Published December 2008 http://www.sriconsulting.com/SCUP/Public/Reports/FLAME000/

manufacturers, importers, downstream users and distributors. Although REACH applies to the European Union only, it is likely that other jurisdictions will enact REACH-like legislation. China and Japan are considering a similar system while the United States would like to reform its thirty-year-old TSCA (Toxic Substance Control Act).

- The WEEE (Waste Electrical and Electronic Equipment) Directive in the European Union requires the separation of plastics containing brominated flame retardants prior to recycling, energy recovery or disposal as of December 31, 2006.

- The RoHS (Restrictions of Hazardous Substances) Draft Directive in the European Union contains a list of substances that are to be phased out of use in the production of electrical and electronic equipment placed on the EU market after July 1, 2006. Under this directive, deca-BDE was banned for use in electrical and electronic applications as of July 1, 2008. The ban applies to manufactured and imported E&E articles ("placed on the market in the EU"). Beginning in 2007, California's Electronic Waste Recycling Act bans the sale of some electronic devices in California if they are prohibited from sale in the European Union under RoHS Directive 2002/95/EC because they contain the heavy metals lead, mercury, cadmium, and hexavalent chromium. On February 28, 2006, China published a new law entitled Administration on the Control of Pollution Caused by Electronic Information Products (ACPEIP), which regulates the dissemination of electronic information products (EIPs) that contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) or polybrominated diphenyl ether (PBDE), similar to the European Union's RoHS Directive. The Republic of Korea issued a legislation similar to RoHS/WEEE called The Act for Resource Recycling of Electrical/Electronic Products and Automobiles to the World Trade Organization (WTO) on March 30, 2006.

- Building cables have to comply with the new European Construction Product Directive CPD EN 13501, which additionally requests testing of acidity, toxicity, and smoke properties. These criteria will adversely affect consumption of PVC and halogenated flame retardants with the main beneficiaries being polyolefins and ATH.

- In the European Union, deca-BDE is banned for use in electronics and electrical applications as of July 1, 2008. The ban applies to manufactured and imported E&E articles ("placed on the market in the EU"). However, the use of deca-BDE is allowed for all other applications. In the United States, Maine and Washington have enacted partial bans on deca-BDE. These bans primarily target the use of deca-BDE in home furniture and consumer electronics. During 2007, several other states (California, Hawaii, Illinois, Michigan, Minnesota and New York) introduced legislation that would phase out or place restrictions on deca-BDE.

- In China, GB 20286-2006—Requirements and Mark on Burning Behaviour of Fire Retarding Products and Subassemblies in Public Places—was implemented on March 1, 2007. The stricter requirements on the burning behaviour of fire retardant materials and products in public places have been put forward in the specification; furthermore, the smoke density and the toxicity of burning products have been especially stressed.

The flame retardant business is highly internationalized. Not only do many companies participate on a worldwide basis, but the impact of regulations in one geographical area often has reverberations throughout the world. Manufacturers of end-use products (e.g., consumer electronics and automobiles), wherever located, must comply with regulations in destination countries for any

products they export. Thus, manufacturers will insist that their raw material suppliers (e.g., resin manufacturers, custom compounders or flame retardant producers) help them meet these requirements. Manufacturers with significant exports follow regulatory developments throughout their market area closely. Because of economies in production and distribution, they may not wish to vary their flame retardant formulations within a specific product line (e.g., computer housings), no matter where it's intended destination. Therefore, they will often utilize flame retardant formulations that meet the most stringent regulations of any region where their product is to be sold.

Flame retardants historically entered the business from a product-oriented view (i.e., manufacturers generally produced similar products for other applications, frequently—at least historically—of much larger volume). Manufacturing companies are meanwhile taking a broader, market-oriented view of the plastics additive business as a whole, but can still be constrained by technology, market access and manufacturing cost considerations when competing with companies that are basic in key raw materials. During the last several years major global producers of brominated compounds have been adding antimony, organophosphorus, zinc/boron and mineral compounds to their product lines, largely through acquisition, but also by adding new manufacturing capacity or through various other agreements.

The plastics industry is the largest consumer of flame retardants, which are sold to basic resin manufacturers, custom compounders or plastics fabricators. However, smaller volumes of flame retardants are also sold to the textile, adhesive, elastomer and paper industries.

The ability to identify and anticipate customer problems and provide solutions is also an essential requirement for a strong competitive position in the flame retardant business. This requires well-directed applied research, highly effective technical service capabilities and a willingness to invest in the facilities and people required to provide them. During the last few years, several main trends have been identified that will direct developments in the global flame retardants industry:

- **Consolidation and globalization** of the flame retardant industry. Flame retardant manufacturers are either trying to complement their product range of flame retardants/plastics additives, gain market share through acquisitions or exit the business.

- Development and implementation of **harmonized and more stringent fire regulations** and tests on a global basis. This will lead to flame retardant systems that offer slower heat release rates in fires along with lower smoke generation, toxicity and corrosivity.

- **Environmental and human health concerns** and ongoing risk assessments regarding brominated and chlorinated compounds. Government regulations and environmental pressures determine trends and drive developments in flame retardant markets and applications and are responsible for the introduction of alternative chemicals and products.

- "**Green" procurement and the quest for halogen-free flame retardants.** Starting about five years ago, OEMs from various end-use industries announced policies away from halogen-containing components. IKEA was one of the first companies to announce that it would no longer use PBDEs in its furniture; its products have been free of brominated flame retardants since 2002. The global automotive industry has expressed the desire to eliminate halogen-containing materials in vehicles and reduce emissions of volatile compounds from interior parts of the car such as PU foams in car seats. Computer manufacturers are now competing to be viewed as green and halogen-based flame retardants are not perceived as green. At least ten major E&E manufacturers have made announcements about

discontinuing or phasing out (by 2009/2010) either PBDEs or all brominated flame retardants; these include Apple, Dell, Ericsson, Hewlett-Packard, IBM, Intel, Motorola, Panasonic, Philips and Sony. Apple plans to completely eliminate the use of PVC and brominated flame retardants in its new products by the end of 2008.

- **Replacement of halogenated flame retardants.** A variety of alternatives are being offered to replace TBBPA including polymeric phosphonates or cyclic hydrogen phosphinates for use in epoxy resins and metal phosphinates for use in polyamides and polyesters. Typical replacement products for deca-BDE in thermoplastics include bisarylphosphates, organic phosphinates, melamine cyanurate, melamine polyphosphate and MDH. For HBCD, no viable alternatives have been identified for its use as a flame retardant in polystyrene insulation foams. However, major research efforts are ongoing to fill this gap.

- **Flame retardant compounds in plastics for higher process and end-use temperatures.**

- **Continuing price increases for all flame retardant types**—in particular for phosphorus compounds—due to increasing costs for feedstock materials, transport and energy.

- **Growth of mineral flame retardant markets.** Inorganic flame retardants, particularly alumina trihydrate and magnesium hydroxide, belong to the fastest-growing group of flame retardants. Several producers have reported expansions of their ATH and MDH plants recently.

[end quote]

Appendix I Non-dust sources of BDEs more prominent human intake

Research[25] carried out by the universities of Antwerp (Belgium), Birmingham (UK) and Assiut (Egypt) shows that the main exposure to BDEs is mainly dietary in the EU, while more influenced by dust in the US. Given the comparative lower use of BDEs in New Zealand compared to the US, the New Zealand human exposure model could be more similar to that in the EU. The abstract of the study reads: [quote]

Human exposure to polybrominated diphenyl ethers (PBDEs) through food and indoor dust ingestion was assessed for 19 Belgian adults. The intake of PBDEs (Σtri-hepta BDEs and BDE 209) in the studied population is influenced mainly by diet. Dietary intakes of Σtri-hepta BDEs (BDEs 28, 47, 99, 100, 153, 154, and 183) were 5.9−22.0 ng/day (median 10.3), while those via dust ingestion were 0.1−1.4 ng/day (median 0.25) or 0.3−3.5 ng/day (average 0.6), assuming dust ingestion rates of 20 and 50 mg/day, respectively. Dietary intakes of BDE 209 were 50−238 ng/day (median 95), whereas those via dust ingestion were 0.4−11 ng/day (median 1.8) or 1.0−29 ng/day (median 4.6) for dust ingestion rates of 20 and 50 mg/day, respectively. It is important to acknowledge the uncertainty associated with the dust ingestion rates. Concentrations of Σtri-hepta BDEs measured in blood serum were 0.9−7.2 ng/g lipid weight (lw) (median 1.9). This is similar to other European populations, but lower than for non occupationally exposed Americans (average of 19 ng/g lw). When compared with estimates of exposure via both dietary and indoor dust ingestion for Americans, the exposures reported here are consistent with the hypothesis that the difference between European and American body burdens of PBDEs is attributable primarily to greater exposure via dust ingestion for Americans. The total intake of PBDEs through food and dust for each participant could not be correlated with the corresponding serum concentration. Instead, it is hypothesized that past and episodic current higher intakes of PBDEs are more important determinants of body burden than continuous background exposures at the low levels measured in this study. [end quote]

Clearly it is important to identify sources of BDEs leading to our environment and finally our food-chain. This aspect needs further research in New Zealand.

[25] Factors Influencing Concentrations of Polybrominated Diphenyl Ethers (PBDEs) in Students from Antwerp, Belgium, Laurence Roosens, Mohamed Abou-Elwafa Abdallah, Stuart Harrad, Hugo Neels and Adrian Covaci, *Environ. Sci. Technol.*, 2009, 43 (10), pp 3535–3541

Appendix J Completed Questionnaire SC-4/19 for submission of information on new POPs in accordance with SC-4/19

PART II – Commercial PentaBDE (tetra- and pentabromodiphenyl ether) and commercial OctaBDE (hepta- and hexabromodiphenyl ether)

SECTION A – GENERAL QUESTIONS

II-A-1 Has your country ever manufactured articles containing commercial PentaBDE or commercial OctaBDE? (Please see Part II - Section B for a list of articles potentially containing commercial PentaBDE or commercial OctaBDE)

☐ Yes (Please also answer the more detailed questions in section B)
☐ No
☐ Unknown

II-A-2 Do you have information on articles in use in your country containing commercial PentaBDE or commercial OctaBDE, including concentrations of those substances in articles?

☐ Yes (Please also answer the more detailed questions in section B)
☐ No

II-A-3 If possible, please provide information on articles containing commercial pentaBDE and octaBDE that are recycled in your country. Please add additional rows if necessary.

Types of articles recycled	**Congener or commercial mixture**	**Rate of recycling of articles (%)**
1.Electronic parts and casings (e.g., made from ABS and high impact styrene)	Size reduction only (shredding, granulation for export)	Nil re-entering NZ market manufacturing from NZ recycling
2.		A small, but unknown % of imported consumer products is likely to contain some recycled BDE containing polymers.
3.		

There are very few articles containing commercial pentaBDE and octaBDE that are recycled in New Zealand. The majority of recycled polymer articles recovered by commercial recycling companies are in the packaging category and are unlikely to contain brominated flame retardants (or flame retardants of any kind). As our research has shown BDEs are limited to a small range of specialist applications and electronics. These include Polymers used in imported electronic parts (circuit boards, television set casings, switches, lamp holders (WEEE type articles), cable coverings, furniture, stereos, home appliances)
A small range of foam, furniture upholstery and furnishing products that are used in commercial and/or public sector settings:
-marine industry, hospitals, schools, stadiums
A small range of New Zealand manufactured industrial applications (cable covering, under floor insulation).

Discussions with polymer recyclers have found that the New Zealand recycling system has very low levels of BDE containing articles (less than 5%) as over 95% of polymers manufactured in New Zealand do not contain BDE flame retardants and the majority of household and post industrial use recycling is destined for food contact and packaging use that do not contain BDE. There is a small specialised electronic recycling industry emerging that breaks down computer and electronic articles for reuse and these parts are likely to contain BDE in the quantum estimated in the database. However, while specialist electronic recyclers will breakdown and some shred and granulate specific parts (e.g., PCBs) the purpose is for size reduction and export to Asia rather than for remanufacturing in New Zealand.

II-A-4 What types of new articles are produced from recycled articles which contained commercial pentaBDE and octaBDE?

Our discussions with recycling industry stakeholders indicates that BDE is unlikely to be in any new articles produced from recycled articles (i.e., from recycled articles containing pentaBDE and octaBDE). While some very small operations have emerged that are specialising in recycling electronics, computers, cell phones and household appliance (WEEE type's products) these operations only break down products for containerising and export to offshore recyclers or deposit these articles in New Zealand landfills (A-3).

Most recyclers and polymer compounders avoid polymers that could contain flame retardants, such as ABS (used in electronic parts) due to problems arising in the compounding process. One such problem is caused by butynol content required in ABS polymers to give the products flexibility. Butynol is lost with each recycling and compounding process and the polymer becomes brittle and less valuable.

II-A-5 Are there any legal or other frameworks (e.g. voluntary agreement, license conditions, extended producer responsibility, export control, labelling requirements, etc.), for waste management and/or recycling of articles containing polybrominated diphenyl ethers under development or currently being implemented in your country? Please add additional rows if necessary.

☐ Yes ☐ No ☐ Unknown

If yes, please describe these frameworks and indicate references. Please add additional rows if needed.

	Description (entry into force, elements of framework, concerned entities, etc.)	**Reference**
Framework for waste management of articles containing PBDE		
Framework for recycling of the articles containing PBDE		

In 2006 Plastics New Zealand launched a voluntary best practice programme (Design for the Environment Guidelines 2006) for its members to improve a range of polymer industry environmental outcomes. The guidelines are an industry/government collaboration (the Ministry for Environment) and cover six design areas:

1. General Guidelines for all polymer products
2. Managing Design for the Environment Projects and four specific guidelines for the
3. Electronics,
4. Packaging,
5. Construction and
6. Agricultural Sectors

Since 2003 Plastics New Zealand has been offering the Plastics Best Practice Programme to its members. During 2005–2006 the Best Practice Programme companies have addressed Design for the Environment requirements. The programme aims to develop products in a way that minimise their environmental impact. In regards to PBDEs, the guidelines provide users with a range of alternatives to halogenated flame retardants[26].

[26] *http://www.polymers.org.nz/_attachments/docs/best-practice-prog-v2-e-final-draft-1.pdf.*

II-A-6 Please identify methods you are aware of for identifying the presence and levels of commercial pentaBDE and octaBDE in articles. Please add additional rows if necessary.

Type of material	Method	Reference
1. Bromine in polymers	XRF analyser provides total bromine only and is not BFR specific	Various
2.		
3.		

While the technology does exist internationally, there are no recycling plants operating in New Zealand that have the "in-line" technology to identify the presence and levels of commercial pentaBDE and octaBDE in recycled articles in recycling operations.

The only available analysis options for specific congeners is laboratory testing of swabs. As a screening tool total bromine can be analysed using hand held or lab based XRF analysers.

For those in the WEEE breaking down sector, flame retardant containing parts of electronic equipment are generally stamped with a mark that signals the presence and the percent of flame retardant in the part.

Recycling participants suggest that because New Zealand lacks the legislation requiring the polymers industry to identify product groups that contain BDEs, then recycling is limited to post consumer packaging materials and/or industrial sources of known specification because other sources of recycled polymers lack standards to ensure traceability.

II-A-7 Please describe recycling operations in your country for articles potentially containing commercial pentaBDE and octaBDE (e.g. large scale commercial recycling of polymers or foams, small backyard recycling of electronic equipment, etc.). Please add additional rows if necessary.

Recycling Operation	Description	Potential releases of commercial pentaBDE and octaBDE
1. Recycling of EPS (small scale)	EPS recycling to make under floor insulation	When using old EPS there is chance p-BDE or o-BDE will be present in the recycled product. However when applied to under concrete foundation insulation it is effectively removed from the environment.

Our research indicates that only one recycling operation exist in New Zealand that potentially uses BDE containing polymers in recycling processes and compounding for remanufacture in New Zealand. This is only for expanded polystyrene.

Most types of polymers are generally broken down by WEEE type recyclers and exported for processing or are deposited in New Zealand landfills.

II-A-8 Please describe measures for the environmental management of recycling operations under development or currently implemented in your country (e.g. flue-gas treatment, water treatment, etc.). Please add additional rows if necessary.

Measures for the environmental management of recycling operations	Description (e.g., effectiveness including cost effectiveness, waste by-products, etc.)
1. Dust control	Un known at this stage – the EPS recycler is a small scale operation in 1 shed on a small Landfill.
2.	
3.	

Given that, besides one small operator, most recyclers in New Zealand do not recycle BDE containing articles there are no environmental management measures used in New Zealand for these articles as the articles are not recycled and therefore BDE are assumed to be contained in alloyed co-polymers and not leaching from recycling operations.

II-A-9 Please provide a list of methods in development or in use for the disposal of articles containing commercial pentaBDE and octaBDE (e.g., environmentally sound disposal, low technology methods, etc.). Please add additional rows if necessary.

Methods for the environmentally sound disposal	**Description (e.g., effectiveness including cost effectiveness, releases, technology in use, etc.)**
1. Landfilling in secure landfill (i.e. having a liner and leachate collection system)	Effective Currently in use Same cost as disposal of non BDE containing waste
2.	
3.	

No specific methods in development or in use for the disposal of articles containing commercial pentaBDE and octaBDE because articles are exported. There are some shredding operations of auto-polymer parts and these are being sent to sanitary landfills.

II-A-10 If your country has identified sites contaminated by commercial pentaBDE and octaBDE e.g. from production and compounding sites or open burning areas, please describe environmentally sound methods used in your country for the remediation of these sites. Please add additional rows if necessary.

Remediation methods for contaminated sites	**Description (e.g., technology in use, effectiveness including cost effectiveness, etc.)**
1. Dig and dispose of to secure landfill	Is available Cost is dependent on fees and transport distance Likely more cost-effective compared to high-tech solutions.
2.	
3.	

II-A-11 Please provide any other related information that may be useful for the work programme to facilitate the elimination of commercial pentaBDE and octaBDE listed under the Stockholm Convention.

Limit recycling of BDE containing polymers. Disposal by incineration with flue gas treatment or landfilling in secure landfills should be preferred options to reduce the human and environmental exposure to BDEs.

II-B-1 Please indicate the types and quantities of articles containing commercial PentaBDE or commercial OctaBDE that were manufactured in your country including concentrations of those substances in the articles. Please also indicate any additional information, such as the years you are referring to, the year when production was stopped, estimates or assumptions used for calculations, the estimated lifetime of products, etc. Please add additional rows as required to include other types of articles. If you do not have information on any of the elements, please indicate "no data".

Refer to data tables in Report

Types of articles	Congener or commercial mixture	Estimated content [% by weight]	Quantities of articles manufactured [kg/year]	Annual amount of PBDE in articles [kg/year]	Comments (e.g. year, assumptions, references, applied emission factors, etc.)	Estimated lifetime of products
EXAMPLES						
ARTICLE X	*BDE-153*	*2%*	*5000 kg/year*	*100kg/year*	*Production from 1995-2000*	*10 years*
ARTICLE X	*BDE-175*	*0.2%*	*2500 kg/year*	*5kg/year*	*Production from 1997-2003*	*7 years*
1. Electronic equipment						
2. Products for buildings/construction						
3. Wire and cables						
4. Textiles						
5. Transportation sector						
6. Other applications						
Total						

II-B-2 Please indicate the types and quantities of articles containing commercial PentaBDE or commercial OctaBDE that currently exist in your country including concentrations of those substances in the articles. Please also indicate any additional information, such as the years you are referring to, the year when production was stopped, estimates or assumptions used for calculations, the estimated lifetime of products, etc. Please add additional rows as required to include other types of articles. If you do not have information on any of the elements, please indicate "no data".

Refer to data tables in Report

Types of articles	Congener or commercial mixture	Estimated content [% by weight]	Quantities of articles in use [kg]	Annual amount of PBDE in articles [kg]	Comments (e.g. year, assumptions, references, applied emission factors, etc.)	Estimated lifetime of products
EXAMPLES						
ARTICLE X	*BDE-153*	*2%*	*5000 kg*	*100kg*	*Data from 2007*	*10 years*
ARTICLE X	*BDE-175*	*0.2%*	*2500 kg*	*5kg*	*Data from 2005*	*4 years*
1. Electronic equipment						
2. Products for buildings/construction						
3. Wire and cables						
4. Textiles						
5.Transportation sector						
6. Other applications						
Total						

Appendix L Questionnaire for organisations that manufacture articles containing BFR's

BFRs of particular interest;

- **PentaBDE (tetra- and pentabromodiphenyl ether),**
- **OctaBDE (hepta- and hexabromodiphenyl ether) and**
- **DecaBDE**

Basic Information

Organisation	
Contact person and contact details	
Industrial Sector	
Main Products Manufactured	
Main source of imported chemicals Country, company	

1. Does your organisation manufacture articles containing flame retardants? Would you know if these are Brominodiethers (BDE's)?
2. ☐ Yes
   ☐ No
   ☐ Unknown

3. Please estimate the mass of manufacturing inputs used containing the BDEs of interest in Table 1?

4. Please estimate the mass of articles that are sold containing the BDEs of interest in Table 2?

5. What is the main destination for sold products as a percentage of total sales volume?
   New Zealand
   Exported

   List countries please:

6. What is the main end use of your products and their expected lifetime?
If more than one end use can you give a breakdown

End Use	*Likely % of your sales*	*Life time of Products*

7. Do you know whether your products are recycled?

Recycled ☐ Yes ☐ No ☐ Unknown

Recycling details (which, *who, how, where):*_____

Table 1. Estimated volume of BDE containing articles used in manufacturing (inputs)

Trade Name of articles	BDE type	Estimated content [% by weight]	Estimated vol of articles [kg/year]	Estimated historical volumes
Styropol S	*Penta-BDE*	*2%*	*5,000*	*1980 – 1989 (kg/yr) 2,500* *1990 – 1999 kg/yr) 5,000* *2000 10,000* *2001 11,000* *2002 12,000* *2003 13,000* *2004 14,000* *2005 15,000* *2006 16,000* *2007 12,000* *2008 10,000* *2009*
				1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008* *2009*
				1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)*

Trade Name of articles	BDE type	Estimated content [% by weight]	Estimated vol of articles [kg/year]	Estimated historical volumes
				2000 *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008* *2009*
				1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008*
				1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002*

Trade Name of articles	BDE type	Estimated content [% by weight]	Estimated vol of articles [kg/year]	Estimated historical volumes
				2003 *2004* *2005* *2006* *2007* *2008* *2009*

Table 2. Estimated volume of BDE containing manufactured articles (outputs/sales)

Trade Name of articles	BDE type	Estimated content [% by weight]	Estimated vol of articles [kg/year]	Annual amount of PBDE in articles [kg/yr]	Estimated historical volumes
Styropol S	*Penta-BDE*	*2%*	*5,000*	*100*	*1980 – 1989 (kg/yr)* *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008* *2009*
					1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008* *2009*
					1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001*

Trade Name of articles	BDE type	Estimated content [% by weight]	Estimated vol of articles [kg/year]	Annual amount of PBDE in articles [kg/yr]	Estimated historical volumes
					2002 *2003* *2004* *2005* *2006* *2007* *2008* *2009*
					1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008* *2009*
					1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004*

Trade Name of articles	BDE type	Estimated content [% by weight]	Estimated vol of articles [kg/year]	Annual amount of PBDE in articles [kg/yr]	Estimated historical volumes
					2005 *2006* *2007* *2008* *2009*
					1980 – 1989 (kg/yr) *1990 – 1999 kg/yr)* *2000* *2001* *2002* *2003* *2004* *2005* *2006* *2007* *2008* *2009*

Appendix M Excel spreadsheet entitled ‘XRF analyser raw data’

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	1									
1-Apr-10	199	**56011**	**5.60%**	2088	Bulb holder		50		2.80	bulb plastic holder /40040111215171039
1-Apr-10	201	**20151**	**2.02%**	538	Bulb holder		30		0.60	bulbs plastic holder/40050111216530608A
1-Apr-10	200	**7512**	**0.75%**	260	Bulb holder	2.8%	50	43	0.38	bulbs plastic holder
8-Apr-10	69	**3297**	**0.33%**	81	car hood lining	0.3%	2200	2,200	7.25	toyota/corolla / late 80s/ hood lining
7-Apr-10	8	**6966**	**0.70%**	202	Car seat		600		4.18	car seat EPS
8-Apr-10	61	**4021**	**0.40%**	83	Car seat		600		2.41	car/ toyota cramry 1996/ seat foam
1-Apr-10	107	**2663**	**0.27%**	74	Car seat		300		0.80	Baby booster car seat/ babywise / KB0166/ 415497127023
8-Apr-10	59	**2645**	**0.26%**	58	Car seat		2000		5.29	car/ toyota cramry 1996/ seats
8-Apr-10	95	**1894**	**0.19%**	50	Car seat		8000		15.15	mazda/ astina/1992
1-Apr-10	83	**1890**	**0.19%**	59	Car seat		2300		4.35	Baby booster car seat/ babywise / KB0166/ 415497127023
1-Apr-10	85	**1886**	**0.19%**	57	Car seat		2300		4.34	Baby booster car seat/ care cushion/ KB0177/ 9415497127313
8-Apr-10	60	**1567**	**0.16%**	29	Car seat		2300		3.60	car/ toyota cramry 1996/ seat cover
1-Apr-10	84	**1076**	**0.11%**	39	Car seat	0.3%	2300	2,300	2.47	Baby booster car seat/ babywise / KB0167/ 415497127030
9-Apr-10	83	**11982**	**1.20%**	217	CD player		400		4.79	transonic cd player/ tc2615cdaux/ handle/ bfr 16
9-Apr-10	82	**11807**	**1.18%**	407	CD player		400		4.72	transonic cd player/ tc2599bb
9-Apr-10	78	**11215**	**1.12%**	215	CD player		400		4.49	transonic cd player/ tc2599bb
9-Apr-10	81	**10759**	**1.08%**	203	CD player		400		4.30	transonic cd player/ tc2599bb

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
9-Apr-10	76	**9023**	**0.90%**	167	CD player		400		3.61	transonic cd player/ tc2599bb
9-Apr-10	77	**7325**	**0.73%**	128	CD player		400		2.93	transonic cd player/ tc2599bb
9-Apr-10	80	**6635**	**0.66%**	113	CD player		400		2.65	transonic cd player/ tc2599bb
9-Apr-10	73	**5431**	**0.54%**	98	CD player		400		2.17	transonic cd micro system with mp3/ no code found
9-Apr-10	79	**3816**	**0.38%**	66	CD player	0.9%	400	400	1.53	transonic cd player/ tc2599bb
7-Apr-10	87	**33987**	**3.40%**	871	dishwasher		12000		407.84	electronics kitchen appliances/dishwasher/Ariston LBF51
7-Apr-10	83	**32354**	**3.24%**	824	dishwasher		12000		388.24	electronics kitchen appliances/dishwasher/Ariston LKF720
7-Apr-10	89	**27248**	**2.72%**	652	dishwasher	3.1%	12000	12,000	326.98	electronics kitchen appliances/dishwasher/Ariston LBF51
7-Apr-10	200	**3749**	**0.37%**	60	eplugs		60		0.22	electrical side entry plugs elto 401201
7-Apr-10	190	**2593**	**0.26%**	49	eplugs	0.3%	70	65	0.18	Elto V quad switch/ESV4 EB308-V/ 107060/ 9421007789438
1-Apr-10	123	**151268**	**15.13%**	7830	Fan heater		1500		226.90	Ceramic fan heater/9421025620027
7-Apr-10	173	**136756**	**13.68%**	6364	Fan heater		100		13.68	electronic fan heater gold air 121587
7-Apr-10	177	**130956**	**13.10%**	6021	Fan heater		650		85.12	electronic fan heaters home basic / 173034
1-Apr-10	124	**128507**	**12.85%**	6101	Fan heater		650		83.53	Electric Fan heaters/2000w/9421007788462
7-Apr-10	174	**83060**	**8.31%**	3266	Fan heater		1500		124.59	electronic fan heaters ceramic tower dimplex 121590
1-Apr-10	119	**52213**	**5.22%**	1679	Fan heater		650		33.94	Electric Fan heaters/Evantair/9421025620003
7-Apr-10	176	**37877**	**3.79%**	1184	Fan heater		1500		56.82	electronic fan heaters de longi htn2032 / 915785

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	118	**33859**	**3.39%**	802	Fan heater		650		22.01	Electric fan heaters/ Red Stamp/ 9421007785683
7-Apr-10	178	**33325**	**3.33%**	783	Fan heater		650		21.66	electronic fan heaters home basic /173035
9-Apr-10	85	**31560**	**3.16%**	804	Fan heater		650		20.51	red stamp/ fan heater 2000 watt/ 9421007785683
9-Apr-10	84	**31194**	**3.12%**	727	Fan heater		650		20.28	red stamp/ fan heater 2000 watt/ 9421007785683
9-Apr-10	86	**30326**	**3.03%**	729	Fan heater		650		19.71	red stamp fan heater 2000 watt/ 421007785683/ bfr 15
9-Apr-10	87	**29649**	**2.96%**	745	Fan heater		650		19.27	red stamp fan heater 2000 watt/ 421007785683/ handle/ bfr 15
1-Apr-10	125	**24804**	**2.48%**	555	Fan heater	6.7%	650	793	16.12	Electric convection heaters/Evantair/ 9421007788486
7-Apr-10	6	**3943**	**0.39%**	156	floor insul		4092		16.13	flooring insulation/expol
7-Apr-10	7	**3857**	**0.39%**	142	floor insul		4591		17.71	flooring insulation/expol
8-Apr-10	8	**3681**	**0.37%**	133	floor insul		5090		18.74	expol insulation polystrene/ 428207/428208/428209/428210
8-Apr-10	8	**3681**	**0.37%**	133	floor insul	0.38%	5590	4,841	20.58	expol insulation polystrene
1-Apr-10	28	**12656**	**1.27%**	313	Freezer		2400		30.37	chest freeze 200L/HB/ 9332066008562 & 240 L =9332066010138
7-Apr-10	100	**1553**	**0.16%**	28	Freezer	0.7%	4000	3,200	6.21	electronics kitchen appliances fridges samsung electronic
1-Apr-10	61	**1134**	**0.11%**	39	furniture other	0.1%	960	960	1.09	furniture footstool polystyr /brava AS pty ltd/ 9415497127061
7-Apr-10	142	**250174**	**25.02%**	15974	hairdryer		260		65.05	electronics hair dryers vidal straightener vs2075ga / 700264
7-Apr-10	138	**16478**	**1.65%**	356	hairdryer	13.3%	500	380	8.24	electronics hair dryers vidal vs5345a / 700264
7-Apr-10	137	**86332**	**8.63%**	3736	iron	8.6%	800	800	69.07	electronics irons accura digital sr6900 sunbeam 701117

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	154	**7442**	**0.74%**	138	iron brd cvr		2000		14.88	kitchen appliances irons board covers 9310205600143
1-Apr-10	160	**7406**	**0.74%**	134	iron brd cvr		2000		14.81	kitchen appliances irons board covers 9310205600143
7-Apr-10	169	**25656**	**2.57%**	641	kettle	2.6%	800	800	20.52	electronics kettles????? Check photos for details
7-Apr-10	34	**9698**	**0.97%**	174	Lap top transformer		110		1.07	elec lap top transformer/toshiba/ HIPRO/s/n F1-091149169301
6-Apr-10	142	**3252**	**0.33%**	55	Lap top transformer		68		0.22	electronic lap tops/HP pavillion/ Mouse / hp sn = k9p94903328
6-Apr-10	151	**1009**	**0.10%**	21	Lap top transformer	0.5%	110	96	0.11	electronic lap top transformer/acer AS 57A69
1-Apr-10	120	**92961**	**9.30%**	3783	Oil heater		440		40.90	Electric oil heaters feet/ Evantair/ 9421007786659
1-Apr-10	117	**5451**	**0.55%**	92	Oil heater	4.9%	250	345	2.40	Electric oil heaters feet/ Red stamp/ 9421025620089
7-Apr-10	157	**11493**	**1.15%**	318	Oven	1.1%	350	350	2.87	electronics bake & grill oven/ BT6700 / 701117
7-Apr-10	196	**152957**	**15.30%**	7353	power board		100		15.30	electrical powerboard 4 way hpm/ 411301
7-Apr-10	197	**80922**	**8.09%**	3191	power board		250		20.23	electrical powerboard 4 way hpm/ 411301
7-Apr-10	195	**17038**	**1.70%**	327	power board	8.4%	85	145	1.45	electrical multibox best buy /106078
7-Apr-10	188	**1662**	**0.17%**	32	power tools	0.2%	85	85	0.14	electronic power tools
1-Apr-10	52	**3176**	**0.32%**	130	PS refil		500		1.59	beanbag refill polystryene 9415497047468
1-Apr-10	53	**1387**	**0.14%**	31	PS refil	0.2%	1500	1,000	2.08	beanbag refill polystryene 9415497047451
7-Apr-10	120	**3467**	**0.35%**	62	sofa		10000		34.67	furniture sofa rufino 3 piece
7-Apr-10	122	**2656**	**0.27%**	49	sofa		350		0.93	furniture nz sofa cover not foam

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	121	**2619**	**0.26%**	61	sofa		350		0.92	furniture nz cpver no foam
6-Apr-10	126	**2543**	**0.25%**	61	sofa		10000		25.43	furniture sofa rufino 3 piece
6-Apr-10	113	**2527**	**0.25%**	58	sofa		10000		25.27	furniture sofa rufino 3 piece
6-Apr-10	114	**2248**	**0.22%**	55	sofa		10000		22.48	furniture sofa rufino 3 piece
8-Apr-10	101	**1351**	**0.14%**	32	sofa		10000		13.51	furniture/ sofa/ captain/ lifcapt-321-sulode
8-Apr-10	138	**1340**	**0.13%**	39	sofa		10000		13.40	furniture/ dining chairs/sally chair/suede licorice/shasall.csulico
8-Apr-10	113	**1301**	**0.13%**	24	sofa		10000		13.01	furniture/ sofa/ leather leopard/CHELEOP_3LR/2LR/R . LEBLA
8-Apr-10	104	**1255**	**0.13%**	23	sofa		10000		12.55	furniture/ sofa/ captain/ lifcapt-321-sulode
8-Apr-10	97	**1188**	**0.12%**	23	sofa		10000		11.88	furniture/ sofa/ captain/ lifcapt-321-sulode
8-Apr-10	139	**1104**	**0.11%**	28	sofa	0.2%	10000	8,392	11.04	furniture/ dining chairs/kadomia d.c. baskado dnc/le
7-Apr-10	69	**182548**	**18.25%**	9977	stereo		2600		474.62	electronics stereo/panasonic back cover/ SC-PMS /700817
7-Apr-10	74	**18596**	**1.86%**	361	stereo		2400		44.63	electronics music stereo teac side / PCD775/
1-Apr-10	12	**17042**	**1.70%**	338	stereo		2975		50.70	radio 9421009513819
7-Apr-10	60	**8502**	**0.85%**	143	stereo		3712		31.56	electronics stereo sony/MHCEC991 and MHCEC791
1-Apr-10	14	**7970**	**0.80%**	143	stereo		530		4.22	radio . transonic 9421009513833
9-Apr-10	71	**7611**	**0.76%**	129	stereo		2400		18.27	transonic stereo / tc2550bb/ 9421009513482
1-Apr-10	10	**5,959**	**0.60%**	98	stereo		2400		14.30	radio transonic 9421009513819

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	62	**3964**	**0.40%**	64	stereo		2400		9.51	electronics music stereo jvc/ NX-G9
7-Apr-10	73	**2304**	**0.23%**	39	stereo		2400		5.53	electronics music stereo teac side / PCD775/
9-Apr-10	70	**1709**	**0.17%**	31	stereo		2400		4.10	transonic radio tco79pr
7-Apr-10	70	**1065**	**0.11%**	21	stereo	2.3%	2400	2,420	2.56	electronics stereo/sony/HCD-EC99i
7-Apr-10	189	**10546**	**1.05%**	187	Swithches	1.1%	85	85	0.90	electrical switches/
7-Apr-10	180	**168895**	**16.89%**	8439	Thermic heater		1600		270.23	electronic mica thermic heaters delongi / 100951
7-Apr-10	182	**124058**	**12.41%**	5670	Thermic heater		2300		285.33	electronic micathermic heaters /nouveau / 100950
7-Apr-10	171	**28535**	**2.85%**	659	Thermic heater		2000		57.07	electronic heaters nouveau 100946
7-Apr-10	175	**1578**	**0.16%**	28	Thermic heater		2000		3.16	electronic ceramic tower heaters / 121588
7-Apr-10	170	**1369**	**0.14%**	30	Thermic heater	6.5%	2000	1,980	2.74	electronic heaters home basic/ 121607
7-Apr-10	153	**1076**	**0.11%**	22	toaster	0.1%	675	675	0.73	electronics toasters/sunbeam TA8200/701117
7-Apr-10	49	**222148**	**22.21%**	12642	TV		2400		533.16	electronics tv back cover sharp/37" LCD / LC37A33X
7-Apr-10	56	**218012**	**21.80%**	12722	TV		2400		523.23	electronics tv back cover LG / 32lH20D
7-Apr-10	57	**205648**	**20.56%**	11892	TV		2400		493.55	electronics tv back cover LG / 32lH20D
7-Apr-10	55	**191487**	**19.15%**	10526	TV		2400		459.57	electronics tv back cover sony / KDL 32 ex500
7-Apr-10	50	**181693**	**18.17%**	9581	TV		2400		436.06	electronics tv back cover panasonic/TH-L375/820933631
7-Apr-10	48	**173395**	**17.34%**	9431	TV		2400		416.15	electronics tv back cover samsung/40" LCD / LA40B550

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	23	**13589**	**1.36%**	258	TV		2400		32.61	tv sanyo 4994334264510
1-Apr-10	22	**7550**	**0.76%**	132	tv		2400		18.12	tv sanyo 4994334264510
7-Apr-10	47	**1781**	**0.18%**	31	tv	13.5%	2400	2,400	4.27	electronics tv back cover samsung/
7-Apr-10	192	**70741**	**7.07%**	2694					-	electrical e/saver tinyspiral 15 w / 400401
1-Apr-10	7	**2093**	**0.21%**	35					-	Calibration
8-Apr-10	150	**1191**	**0.12%**	23					-	retests
8-Apr-10	151	**1005**	**0.10%**	19					-	retests
8-Apr-10	145	**992**	**0.10%**	32					-	furniture/ dining chairs/ acacia 7 piecr dining
8-Apr-10	115	**954**	**0.10%**	26					-	furniture/ sofa/ leather leopard/CHELEOP_3LR/2LR/R . LEBLA
8-Apr-10	103	**944**	**0.09%**	28					-	furniture/ sofa/ captain/ lifcapt-321-sulode
8-Apr-10	11	**912**	**0.09%**	18					-	carpet
8-Apr-10	109	**902**	**0.09%**	27					-	furniture/ sofa/ captain/ lifcapt-321-sulode
1-Apr-10	190	**898**	**0.09%**	17					-	lights
7-Apr-10	15	**884**	**0.09%**	19					-	electronic desk top/mouse
7-Apr-10	92	**879**	**0.09%**	19					-	electronics kitchen appliances/dishwasher
6-Apr-10	111	**863**	**0.09%**	23					-	furniture sofa

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	119	**853**	**0.09%**	27					-	furniture sofa
7-Apr-10	4	**844**	**0.08%**	16					-	electronic lap tops/mouse
7-Apr-10	150	**836**	**0.08%**	19					-	electronics fryers
8-Apr-10	102	**833**	**0.08%**	27					-	furniture/ sofa/ captain/ lifcapt-321-sulode
8-Apr-10	141	**832**	**0.08%**	26					-	furniture/ dining chairs/Napoli d.c. mastic
7-Apr-10	5	**823**	**0.08%**	16					-	electronic lap tops/mouse
7-Apr-10	88	**820**	**0.08%**	18					-	electronics kitchen appliances/dishwasher/Ariston LBF51
8-Apr-10	114	**818**	**0.08%**	22					-	furniture/ sofa/ leather leopard/CHELEOP_3LR/2LR/R . LEBLA
8-Apr-10	137	**798**	**0.08%**	22					-	furniture/ dining chairs/florence/ salflor-c-scldbrn
8-Apr-10	122	**774**	**0.08%**	26					-	furniture/ sofa/
8-Apr-10	118	**751**	**0.08%**	21					-	furniture/ sofa/
8-Apr-10	5	**733**	**0.07%**	14					-	roofing /polycarbonate or PVC?
6-Apr-10	132	**722**	**0.07%**	21					-	furniture beds
6-Apr-10	138	**719**	**0.07%**	23					-	furniture dining seat
8-Apr-10	4	**717**	**0.07%**	14					-	roofing /polycarbonate or PVC?
8-Apr-10	91	**713**	**0.07%**	19					-	furniture/ sofa/ import
8-Apr-10	152	**696**	**0.07%**	14					-	retests

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	50	**688**	**0.07%**	19					-	car/ bmw / germany 1980s/ 528 i
1-Apr-10	174	**686**	**0.07%**	16					-	power tools
1-Apr-10	5	**682**	**0.07%**	14					-	Calibration
6-Apr-10	33	**674**	**0.07%**	24					-	sofa
6-Apr-10	107	**673**	**0.07%**	21					-	sofa
7-Apr-10	156	**664**	**0.07%**	17					-	electronics toasters
1-Apr-10	6	**664**	**0.07%**	13					-	Calibration
6-Apr-10	59	**653**	**0.07%**	18					-	flooring carpet tiles
6-Apr-10	34	**651**	**0.07%**	24					-	nz dining
1-Apr-10	99	**605**	**0.06%**	17					-	cusions pillows
1-Apr-10	171	**593**	**0.06%**	15					-	power tools
6-Apr-10	41	**591**	**0.06%**	16					-	bed fabrics throw
7-Apr-10	152	**586**	**0.06%**	14					-	electronics toasters
6-Apr-10	108	**584**	**0.06%**	19					-	furniture sofa
8-Apr-10	42	**583**	**0.06%**	14					-	car/ opel vectra 2.0l / european 1998 side panel foam material
9-Apr-10	75	**582**	**0.06%**	14					-	sanyo cd player/ 4994334267597
8-Apr-10	147	**568**	**0.06%**	14					-	furniture/ dining chairs

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	96	**564**	**0.06%**	19					-	furniture/ sofa/
7-Apr-10	162	**551**	**0.06%**	13					-	electronics kettles
1-Apr-10	97	**549**	**0.05%**	15					-	cusions pillows
7-Apr-10	103	**532**	**0.05%**	12					-	electronics kitchen appliances fridges
7-Apr-10	32	**530**	**0.05%**	13					-	electronic acer transformer/AS57409
8-Apr-10	67	**522**	**0.05%**	21					-	toyota/corolla / late 80s/ side panel
6-Apr-10	121	**516**	**0.05%**	19					-	furniture sofa
8-Apr-10	89	**504**	**0.05%**	17					-	furniture/ sofa/ import
1-Apr-10	194	**494**	**0.05%**	22					-	lights
6-Apr-10	124	**482**	**0.05%**	16					-	furniture beds
6-Apr-10	149	**480**	**0.05%**	12					-	electronic lap tops
8-Apr-10	120	**466**	**0.05%**	18					-	furniture/ sofa/
6-Apr-10	95	**465**	**0.05%**	15					-	carpet underlay/ foam
6-Apr-10	29	**464**	**0.05%**	15					-	wall board mount
8-Apr-10	111	**462**	**0.05%**	18					-	furniture/ sofa/
1-Apr-10	115	**460**	**0.05%**	12					-	children toys
6-Apr-10	122	**453**	**0.05%**	16					-	furniture sofa

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	186	**452**	**0.05%**	12					-	electronic power tools heat gun
8-Apr-10	119	**447**	**0.04%**	17					-	furniture/ sofa/
7-Apr-10	79	**443**	**0.04%**	11					-	electronics music stereo
6-Apr-10	67	**442**	**0.04%**	10					-	curtains/drapes
6-Apr-10	116	**437**	**0.04%**	16					-	furniture sofa
8-Apr-10	130	**436**	**0.04%**	17					-	furniture/ sofa/
8-Apr-10	93	**428**	**0.04%**	15					-	mazda/ astina/1992
8-Apr-10	132	**426**	**0.04%**	18					-	furniture/ sofa/
6-Apr-10	147	**426**	**0.04%**	10					-	electronic lap tops
6-Apr-10	139	**417**	**0.04%**	17					-	furniture dining seat
7-Apr-10	99	**415**	**0.04%**	63					-	electronics kitchen appliances fridges
8-Apr-10	140	**403**	**0.04%**	16					-	furniture/ dining chairs/Napoli d.c. mastic
1-Apr-10	44	**397**	**0.04%**	11					-	clothes
1-Apr-10	163	**397**	**0.04%**	12					-	car seat covers
6-Apr-10	131	**396**	**0.04%**	15					-	furniture beds
1-Apr-10	152	**389**	**0.04%**	16					-	kitchen appliances irons
6-Apr-10	71	**383**	**0.04%**	10					-	curtains/drapes

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	148	**377**	**0.04%**	10					-	furniture/ dining chairs
7-Apr-10	108	**375**	**0.04%**	11					-	electronics kitchen appliances fridges
7-Apr-10	163	**372**	**0.04%**	13					-	electronics kettles
6-Apr-10	112	**370**	**0.04%**	15					-	furniture sofa
1-Apr-10	167	**336**	**0.03%**	13					-	car seat covers
1-Apr-10	178	**333**	**0.03%**	12					-	power tools
1-Apr-10	137	**329**	**0.03%**	11					-	kitchen appliances
1-Apr-10	63	**320**	**0.03%**	13					-	furniture dining seat
1-Apr-10	54	**316**	**0.03%**	11					-	furniture dining seat 9401047900123
6-Apr-10	145	**316**	**0.03%**	9					-	electronic lap tops
6-Apr-10	62	**316**	**0.03%**	8					-	curtains/drapes
6-Apr-10	66	**313**	**0.03%**	8					-	curtains/drapes
9-Apr-10	74	**312**	**0.03%**	9					-	transonic cd micro system with mp3
6-Apr-10	110	**307**	**0.03%**	13					-	furniture sofa
7-Apr-10	81	**299**	**0.03%**	9					-	electronics music stereo
7-Apr-10	82	**291**	**0.03%**	20					-	electronics kitchen appliances/dishwasher
7-Apr-10	202	**289**	**0.03%**	11					-	roofing /polycarbonate or PVC?

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	164	**275**	**0.03%**	10					-	car seat covers
8-Apr-10	99	**271**	**0.03%**	13					-	furniture/ sofa/
1-Apr-10	98	**269**	**0.03%**	10					-	cusions pillows
1-Apr-10	18	**267**	**0.03%**	8					-	radio . transonic
1-Apr-10	193	**267**	**0.03%**	9					-	lights
1-Apr-10	145	**261**	**0.03%**	8					-	kitchen appliances small oven
6-Apr-10	115	**260**	**0.03%**	12					-	furniture sofa
8-Apr-10	88	**259**	**0.03%**	11					-	furniture/ sofa/ import
1-Apr-10	11	**258**	**0.03%**	7					-	radio
8-Apr-10	149	**255**	**0.03%**	8					-	furniture/ dining chairs
8-Apr-10	142	**249**	**0.02%**	12					-	furniture/ dining chairs
8-Apr-10	98	**248**	**0.02%**	12					-	furniture/ sofa/
6-Apr-10	97	**236**	**0.02%**	9					-	carpet underlay/ foam
7-Apr-10	129	**236**	**0.02%**	8					-	electronics mixer
8-Apr-10	131	**233**	**0.02%**	10					-	furniture/ sofa/
8-Apr-10	87	**232**	**0.02%**	11					-	mazda/ astina/1992
8-Apr-10	9	**228**	**0.02%**	7					-	carpet underlay late nineties

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	96	**220**	**0.02%**	9					-	carpet underlay/ foam
8-Apr-10	94	**217**	**0.02%**	12					-	mazda/ astina/1992
6-Apr-10	130	**211**	**0.02%**	10					-	furniture beds
1-Apr-10	86	**203**	**0.02%**	10					-	childrens car seats
8-Apr-10	100	**201**	**0.02%**	11					-	furniture/ sofa/
8-Apr-10	40	**196**	**0.02%**	6					-	car/ opel vectra 2.0l / european 1998 internal trim
6-Apr-10	37	**195**	**0.02%**	10					-	bed
8-Apr-10	107	**191**	**0.02%**	10					-	furniture/ sofa/
9-Apr-10	69	**186**	**0.02%**	7					-	transonic radio tc079pr
6-Apr-10	99	**186**	**0.02%**	8					-	carpet underlay/ foam
7-Apr-10	51	**185**	**0.02%**	40					-	electronics tv back cover samsung led
6-Apr-10	150	**183**	**0.02%**	6					-	electronic lap tops
8-Apr-10	108	**181**	**0.02%**	10					-	furniture/ sofa/
1-Apr-10	166	**181**	**0.02%**	9					-	car seat covers
7-Apr-10	143	**179**	**0.02%**	8					-	electronics hair dryers
6-Apr-10	85	**178**	**0.02%**	6					-	curtains/drapes
1-Apr-10	19	**172**	**0.02%**	6					-	tv

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	62	**168**	**0.02%**	9					-	furniture dining seat
7-Apr-10	67	**167**	**0.02%**	6					-	electronics music stereo
7-Apr-10	187	**166**	**0.02%**	7					-	electronic power tools heat gun
7-Apr-10	124	**165**	**0.02%**	7					-	electronics juicers
6-Apr-10	98	**161**	**0.02%**	7					-	carpet underlay/ foam
1-Apr-10	170	**160**	**0.02%**	6					-	power tools
7-Apr-10	167	**159**	**0.02%**	7					-	electronics kettles
6-Apr-10	74	**158**	**0.02%**	6					-	curtains/drapes
6-Apr-10	39	**157**	**0.02%**	9					-	bed
1-Apr-10	81	**156**	**0.02%**	8					-	blankets
6-Apr-10	23	**155**	**0.02%**	7					-	nylon/wool mix
1-Apr-10	36	**155**	**0.02%**	9					-	footware
1-Apr-10	169	**151**	**0.02%**	7					-	car seat covers
7-Apr-10	33	**150**	**0.02%**	6					-	electronic lap tops
6-Apr-10	100	**149**	**0.01%**	7					-	carpet underlay/ foam
8-Apr-10	83	**145**	**0.01%**	8					-	mazda/ astina/1992/seat
7-Apr-10	54	**145**	**0.01%**	27					-	electronics tv back cover panasonic

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	77	**143**	**0.01%**	30					-	electronics music stereo
7-Apr-10	71	**141**	**0.01%**	28					-	electronics music stereo
1-Apr-10	82	**140**	**0.01%**	7					-	blankets
8-Apr-10	146	**140**	**0.01%**	10					-	furniture/ dining chairs
1-Apr-10	15	**138**	**0.01%**	6					-	radio . sanyo
8-Apr-10	76	**138**	**0.01%**	7					-	fuji / subaru legacy/ 1993 /seat
7-Apr-10	96	**138**	**0.01%**	31					-	electronics kitchen appliances fridges
8-Apr-10	82	**137**	**0.01%**	7					-	fuji / subaru legacy/ 1993/ seats
6-Apr-10	137	**137**	**0.01%**	9					-	furniture dining seat
6-Apr-10	120	**136**	**0.01%**	8					-	furniture sofa
7-Apr-10	38	**136**	**0.01%**	31					-	electronics tv/lg/front
1-Apr-10	21	**131**	**0.01%**	6					-	tv
8-Apr-10	80	**124**	**0.01%**	8					-	fuji / subaru legacy/ 1993/ hood lining
1-Apr-10	185	**124**	**0.01%**	13					-	irons
8-Apr-10	85	**121**	**0.01%**	6					-	mazda/ astina/1992/ sidepanel/lining
7-Apr-10	114	**121**	**0.01%**	6					-	electronics vacuum cleaners
6-Apr-10	86	**121**	**0.01%**	5					-	curtains/drapes

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	3	**118**	**0.01%**	5					-	electronic lap tops
1-Apr-10	24	**117**	**0.01%**	27					-	tv
6-Apr-10	84	**116**	**0.01%**	5					-	curtains/drapes
8-Apr-10	3	**116**	**0.01%**	5					-	roofing /polycarbonate or PVC?
6-Apr-10	129	**115**	**0.01%**	8					-	furniture beds
6-Apr-10	61	**115**	**0.01%**	5					-	curtains/drapes
7-Apr-10	2	**115**	**0.01%**	4					-	electronic lap tops
7-Apr-10	44	**111**	**0.01%**	5					-	electronics tv samsung/front
8-Apr-10	2	**111**	**0.01%**	4					-	roofing /polycarbonate or PVC?
7-Apr-10	194	**106**	**0.01%**	5					-	electrical switches HPM Australia
1-Apr-10	3	**105**	**0.01%**	4					-	Calibration
1-Apr-10	153	**102**	**0.01%**	7					-	kitchen appliances irons
7-Apr-10	110	**101**	**0.01%**	17					-	electronics kitchen appliances fridges
8-Apr-10	74	**101**	**0.01%**	6					-	nissan / bluebird/ 1990/ seat
7-Apr-10	72	**98**	**0.01%**	5					-	electronics music stereo
8-Apr-10	20	**97**	**0.01%**	5					-	car /
7-Apr-10	84	**97**	**0.01%**	16					-	electronics kitchen appliances/dishwashers

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	68	**95**	**0.01%**	4					-	curtains/drapes
1-Apr-10	4	**91**	**0.01%**	4					-	Calibration
7-Apr-10	184	**91**	**0.01%**	6					-	electronic power tools drill
8-Apr-10	12	**90**	**0.01%**	6					-	carpet underlay late nineties
6-Apr-10	70	**89**	**0.01%**	4					-	curtains/drapes
1-Apr-10	105	**86**	**0.01%**	7					-	kids soft toys
6-Apr-10	128	**85**	**0.01%**	6					-	furniture beds
1-Apr-10	16	**83**	**0.01%**	4					-	radio . phillips
8-Apr-10	38	**83**	**0.01%**	5					-	car/ opel vectra 2.0l / european seats
8-Apr-10	79	**83**	**0.01%**	5					-	fuji / subaru legacy/ 1993/ side panel
1-Apr-10	92	**83**	**0.01%**	6					-	curtain
8-Apr-10	31	**82**	**0.01%**	6					-	car / ford telstar japan 1996 car seat
1-Apr-10	184	**78**	**0.01%**	9					-	irons
8-Apr-10	153	**77**	**0.01%**	4					-	retests
8-Apr-10	70	**76**	**0.01%**	5					-	nissan / bluebird/ seats
1-Apr-10	2	**76**	**0.01%**	4					-	Calibration
7-Apr-10	43	**76**	**0.01%**	4					-	electronics tv samsung/front

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	69	**75**	**0.01%**	4					-	carpets
8-Apr-10	10	**75**	**0.01%**	4					-	carpet underlay late nineties
1-Apr-10	89	**73**	**0.01%**	4					-	curtain
7-Apr-10	97	**73**	**0.01%**	20					-	electronics kitchen appliances fridges
7-Apr-10	12	**72**	**0.01%**	4					-	electronic desk top
8-Apr-10	86	**69**	**0.01%**	7					-	mazda/ astina/1992/ hood lining
8-Apr-10	105	**69**	**0.01%**	6					-	furniture/ sofa/
8-Apr-10	143	**68**	**0.01%**	7					-	furniture/ dining chairs
1-Apr-10	104	**68**	**0.01%**	5					-	kids soft toys
8-Apr-10	125	**68**	**0.01%**	6					-	furniture/ sofa/
1-Apr-10	128	**66**	**0.01%**	5					-	oil heaters
7-Apr-10	19	**65**	**0.01%**	3					-	electronic desk top
6-Apr-10	69	**65**	**0.01%**	4					-	curtains/drapes
1-Apr-10	17	**65**	**0.01%**	4					-	radio
9-Apr-10	72	**64**	**0.01%**	4					-	transonic cd micro system with mp3
8-Apr-10	75	**63**	**0.01%**	4					-	nissan / bluebird/ 1990/ side panel foaml lining
8-Apr-10	66	**63**	**0.01%**	5					-	toyota/corolla / late 80s/ seat

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	141	**61**	**0.01%**	3					-	electronic lap tops
6-Apr-10	143	**60**	**0.01%**	4					-	electronic lap tops
7-Apr-10	25	**60**	**0.01%**	4					-	electronic lap tops
8-Apr-10	37	**59**	**0.01%**	4					-	car/ lada late 80s russia dash board
8-Apr-10	45	**58**	**0.01%**	4					-	car/ bmw / germany 1980s door trim foam
1-Apr-10	132	**57**	**0.01%**	6					-	kitchen appliances
8-Apr-10	77	**57**	**0.01%**	4					-	fuji / subaru legacy/ 1993steering wheel
7-Apr-10	42	**56**	**0.01%**	4					-	electronics tv sharp/front
1-Apr-10	94	**55**	**0.01%**	5					-	cushion
7-Apr-10	160	**54**	**0.01%**	16					-	electronics bench top ovens
6-Apr-10	75	**54**	**0.01%**	4					-	curtains/drapes
1-Apr-10	181	**54**	**0.01%**	8					-	ironing boards
7-Apr-10	41	**54**	**0.01%**	3					-	electronics tv sharp/front
6-Apr-10	12	**53**	**0.01%**	5					-	nylon carpet
1-Apr-10	112	**53**	**0.01%**	4					-	children toys
6-Apr-10	103	**51**	**0.01%**	4					-	carpet wool / nylon
1-Apr-10	106	**51**	**0.01%**	4					-	kids soft toys

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	128	**49**	**0.00%**	5					-	furniture/ sofa/
8-Apr-10	133	**48**	**0.00%**	5					-	furniture/ sofa/
7-Apr-10	24	**48**	**0.00%**	4					-	electronic lap tops
8-Apr-10	78	**48**	**0.00%**	3					-	fuji / subaru legacy/ 1993/ dssh board
6-Apr-10	38	**48**	**0.00%**	5					-	nz chair
7-Apr-10	144	**47**	**0.00%**	6					-	electronics hair dryers
6-Apr-10	80	**47**	**0.00%**	3					-	curtains/drapes
8-Apr-10	106	**47**	**0.00%**	4					-	furniture/ sofa/
6-Apr-10	125	**46**	**0.00%**	5					-	furniture beds
7-Apr-10	141	**46**	**0.00%**	4					-	electronics hair dryers
8-Apr-10	127	**44**	**0.00%**	5					-	furniture/ sofa/
8-Apr-10	117	**43**	**0.00%**	4					-	furniture/ sofa/
7-Apr-10	26	**42**	**0.00%**	4					-	electronic lap tops
1-Apr-10	157	**42**	**0.00%**	9					-	kitchen appliances irons board covers
8-Apr-10	73	**40**	**0.00%**	4					-	nissan / bluebird/ 1990/hood lining
7-Apr-10	23	**39**	**0.00%**	10					-	electronic desk top
8-Apr-10	43	**38**	**0.00%**	3					-	car/ opel vectra 2.0l / european 1998/ centre console

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	134	**38**	**0.00%**	4					-	furniture/ sofa/
1-Apr-10	33	**38**	**0.00%**	5					-	footware
7-Apr-10	158	**38**	**0.00%**	4					-	electronics bench top ovens
6-Apr-10	118	**38**	**0.00%**	4					-	furniture sofa
1-Apr-10	20	**38**	**0.00%**	3					-	tv
1-Apr-10	27	**37**	**0.00%**	4					-	freezers/fridges
6-Apr-10	109	**37**	**0.00%**	4					-	furniture sofa
6-Apr-10	134	**37**	**0.00%**	4					-	furniture beds
1-Apr-10	139	**37**	**0.00%**	4					-	kitchen appliances toasters
7-Apr-10	80	**35**	**0.00%**	3					-	electronics music stereo
8-Apr-10	48	**34**	**0.00%**	4					-	car/ bmw / germany 1980s/ 528 i dash board
7-Apr-10	27	**34**	**0.00%**	3					-	electronic lap tops
1-Apr-10	113	**33**	**0.00%**	3					-	children toys
6-Apr-10	127	**33**	**0.00%**	4					-	furniture beds
8-Apr-10	30	**33**	**0.00%**	3					-	car / ford telstar japan 1996 internal trim panel
6-Apr-10	87	**33**	**0.00%**	4					-	cushions
7-Apr-10	18	**33**	**0.00%**	3					-	electronic desk top

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	181	**32**	**0.00%**	3					-	electronic fan heaters
7-Apr-10	78	**32**	**0.00%**	14					-	electronics music stereo
8-Apr-10	34	**32**	**0.00%**	4					-	car/ lada late 80s russia seat
7-Apr-10	201	**32**	**0.00%**	3					-	electrical bathroom halogen heaters
1-Apr-10	102	**32**	**0.00%**	3					-	cusions pillows
7-Apr-10	46	**32**	**0.00%**	2					-	electronics tv/sony/front
8-Apr-10	56	**32**	**0.00%**	4					-	car/ toyota cressida 1984 seats
1-Apr-10	196	**31**	**0.00%**	5					-	lamp shades
8-Apr-10	129	**31**	**0.00%**	4					-	furniture/ sofa/
6-Apr-10	53	**30**	**0.00%**	3					-	carpet underlay/foam dunlop
6-Apr-10	13	**30**	**0.00%**	4					-	nylon carpet
7-Apr-10	132	**30**	**0.00%**	8					-	electronics irons
8-Apr-10	62	**30**	**0.00%**	3					-	car/ toyota cramry 1996/ side panel
6-Apr-10	65	**30**	**0.00%**	3					-	curtains/drapes
1-Apr-10	80	**30**	**0.00%**	4					-	blankets
6-Apr-10	76	**30**	**0.00%**	3					-	curtains/drapes
8-Apr-10	7	**29**	**0.00%**	2					-	roofing /polycarbonate or PVC?

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	95	**29**	**0.00%**	3					-	electronics kitchen appliances/dishwasher
7-Apr-10	159	**28**	**0.00%**	3					-	electronics bench top ovens
8-Apr-10	49	**28**	**0.00%**	3					-	car/ bmw / germany 1980s/ 528 i seats
6-Apr-10	35	**28**	**0.00%**	4					-	sofa
8-Apr-10	58	**28**	**0.00%**	3					-	car/ toyota cramry 1996/ dash board
7-Apr-10	65	**27**	**0.00%**	2					-	electronics music stereo
1-Apr-10	114	**27**	**0.00%**	4					-	children toys
1-Apr-10	111	**27**	**0.00%**	4					-	children toys
8-Apr-10	52	**27**	**0.00%**	3					-	car/ toyota cressida 1984
7-Apr-10	146	**26**	**0.00%**	3					-	electronics grills
1-Apr-10	50	**26**	**0.00%**	3					-	clothes
7-Apr-10	113	**26**	**0.00%**	2					-	electronics vacuum cleaners
7-Apr-10	148	**25**	**0.00%**	3					-	electronics grills
7-Apr-10	161	**25**	**0.00%**	2					-	electronics kettles
1-Apr-10	25	**25**	**0.00%**	3					-	freezers/fridges
6-Apr-10	32	**25**	**0.00%**	4					-	nz sofa
1-Apr-10	93	**24**	**0.00%**	3					-	curtain

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	102	**24**	**0.00%**	3					-	carpet all weather safety
7-Apr-10	94	**24**	**0.00%**	2					-	electronics kitchen appliances/dishwasher
6-Apr-10	123	**24**	**0.00%**	3					-	furniture sofa
1-Apr-10	110	**24**	**0.00%**	3					-	children toys
6-Apr-10	40	**23**	**0.00%**	3					-	chair
6-Apr-10	54	**23**	**0.00%**	3					-	flooring wool carpet
1-Apr-10	48	**23**	**0.00%**	3					-	clothes
7-Apr-10	11	**23**	**0.00%**	2					-	electronic desk top
1-Apr-10	66	**23**	**0.00%**	4					-	furniture matress
7-Apr-10	165	**23**	**0.00%**	5					-	electronics kettles
6-Apr-10	72	**23**	**0.00%**	2					-	curtains/drapes
6-Apr-10	48	**22**	**0.00%**	3					-	bed fabrics
8-Apr-10	68	**22**	**0.00%**	3					-	toyota/corolla / late 80s / dashboard
7-Apr-10	93	**21**	**0.00%**	11					-	electronics kitchen appliances/dishwasher
8-Apr-10	32	**21**	**0.00%**	2					-	car / ford telstar japan 1996 steering wheel
1-Apr-10	158	**21**	**0.00%**	4					-	kitchen appliances irons board covers
1-Apr-10	126	**21**	**0.00%**	5					-	oil heaters

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	151	**21**	**0.00%**	7					-	kitchen appliances irons
6-Apr-10	78	**21**	**0.00%**	2					-	curtains/drapes
1-Apr-10	155	**21**	**0.00%**	4					-	kitchen appliances irons board covers
1-Apr-10	26	**21**	**0.00%**	5					-	freezers/fridges
1-Apr-10	13	**21**	**0.00%**	2					-	radio philips
6-Apr-10	104	**20**	**0.00%**	3					-	carpet wool / nylon
7-Apr-10	151	**20**	**0.00%**	2					-	electronics fryers
8-Apr-10	126	**20**	**0.00%**	3					-	furniture/ sofa/
1-Apr-10	34	**20**	**0.00%**	4					-	footware
8-Apr-10	116	**20**	**0.00%**	2					-	furniture/ sofa/
6-Apr-10	82	**20**	**0.00%**	2					-	curtains/drapes
1-Apr-10	57	**20**	**0.00%**	4					-	furniture dining seat
7-Apr-10	36	**20**	**0.00%**	2					-	electronics tv/lg/front
8-Apr-10	55	**19**	**0.00%**	4					-	car/ toyota cressida 1984 hood lining
6-Apr-10	24	**19**	**0.00%**	3					-	nylon/wool mix
1-Apr-10	64	**19**	**0.00%**	3					-	furniture dining seat
1-Apr-10	173	**19**	**0.00%**	3					-	power tools

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	90	**19**	**0.00%**	3					-	furniture/ sofa/ import
1-Apr-10	192	**19**	**0.00%**	6					-	lights
1-Apr-10	188	**19**	**0.00%**	3					-	carpets
1-Apr-10	189	**18**	**0.00%**	3					-	curtains
1-Apr-10	76	**17**	**0.00%**	3					-	carpets
1-Apr-10	191	**17**	**0.00%**	3					-	lights
1-Apr-10	78	**17**	**0.00%**	3					-	duvets
7-Apr-10	16	**17**	**0.00%**	2					-	electronic desk top
1-Apr-10	131	**17**	**0.00%**	2					-	oil heaters
6-Apr-10	20	**17**	**0.00%**	2					-	nylon
1-Apr-10	156	**17**	**0.00%**	9					-	kitchen appliances irons board covers
7-Apr-10	164	**17**	**0.00%**	2					-	electronics kettles
7-Apr-10	199	**17**	**0.00%**	8					-	electrical switches
7-Apr-10	58	**16**	**0.00%**	2					-	electronics music stereo
8-Apr-10	13	**16**	**0.00%**	3					-	carpet underlay late nineties
1-Apr-10	41	**16**	**0.00%**	2					-	footware
6-Apr-10	135	**16**	**0.00%**	3					-	furniture beds

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	124	**16**	**0.00%**	4					-	furniture/ sofa/
1-Apr-10	51	**16**	**0.00%**	2					-	clothes
6-Apr-10	43	**16**	**0.00%**	3					-	bed fabrics duvet
7-Apr-10	126	**16**	**0.00%**	2					-	electronics juicers
6-Apr-10	77	**15**	**0.00%**	2					-	curtains/drapes
6-Apr-10	49	**15**	**0.00%**	3					-	dining chair
1-Apr-10	165	**15**	**0.00%**	4					-	car seat covers
1-Apr-10	175	**15**	**0.00%**	4					-	power tools
7-Apr-10	123	**15**	**0.00%**	2					-	electronics vacuum cleaners
7-Apr-10	172	**15**	**0.00%**	2					-	electronic fan heaters
1-Apr-10	68	**15**	**0.00%**	4					-	carpets
8-Apr-10	47	**15**	**0.00%**	2					-	car/ bmw / germany 1980s/ 528 i
6-Apr-10	30	**15**	**0.00%**	2					-	wall board mount
7-Apr-10	85	**15**	**0.00%**	2					-	electronics kitchen appliances/dishwashers
6-Apr-10	25	**15**	**0.00%**	3					-	vinyl
7-Apr-10	154	**15**	**0.00%**	3					-	electronics toasters
1-Apr-10	195	**14**	**0.00%**	4					-	lamp shades

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	22	**14**	**0.00%**	2					-	car /
6-Apr-10	47	**14**	**0.00%**	3					-	nzsofa fabric
6-Apr-10	101	**14**	**0.00%**	2					-	carpet all weather safety
1-Apr-10	183	**14**	**0.00%**	2					-	irons
1-Apr-10	144	**14**	**0.00%**	2					-	kitchen appliances small grills
6-Apr-10	133	**14**	**0.00%**	3					-	furniture beds
6-Apr-10	36	**14**	**0.00%**	3					-	cushion
6-Apr-10	44	**14**	**0.00%**	3					-	bed fabrics
8-Apr-10	41	**13**	**0.00%**	2					-	car/ opel vectra 2.0l / european 1998 dash board
1-Apr-10	127	**13**	**0.00%**	2					-	oil heaters
1-Apr-10	75	**13**	**0.00%**	3					-	carpets
1-Apr-10	87	**13**	**0.00%**	2					-	curtain
6-Apr-10	51	**13**	**0.00%**	2					-	carpet underlay/foam dunlop
1-Apr-10	72	**13**	**0.00%**	2					-	carpets
1-Apr-10	49	**13**	**0.00%**	2					-	clothes
8-Apr-10	72	**13**	**0.00%**	2					-	nissan / bluebird/ 1990/dash board
1-Apr-10	202	**13**	**0.00%**	4					-	bulbs plastic holder

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	46	**13**	**0.00%**	3					-	car/ bmw / germany 1980s/ 528 i door trim
1-Apr-10	71	**13**	**0.00%**	3					-	carpets
7-Apr-10	22	**13**	**0.00%**	2					-	electronic desk top
1-Apr-10	159	**13**	**0.00%**	3					-	kitchen appliances irons board covers
1-Apr-10	55	**13**	**0.00%**	3					-	furniture foam matress
6-Apr-10	27	**13**	**0.00%**	2					-	nylon
8-Apr-10	25	**12**	**0.00%**	2					-	car / ford laser door panel
7-Apr-10	168	**12**	**0.00%**	2					-	electronics kettles
7-Apr-10	98	**12**	**0.00%**	2					-	electronics kitchen appliances fridges
6-Apr-10	57	**12**	**0.00%**	3					-	flooring polypropylene
1-Apr-10	177	**12**	**0.00%**	4					-	power tools
8-Apr-10	54	**12**	**0.00%**	3					-	car/ toyota cressida 1984 dash board
6-Apr-10	144	**12**	**0.00%**	2					-	electronic lap tops
6-Apr-10	21	**12**	**0.00%**	2					-	nylon/wool mix
1-Apr-10	141	**12**	**0.00%**	2					-	kitchen appliances toasters
1-Apr-10	135	**11**	**0.00%**	2					-	kitchen appliances
6-Apr-10	92	**11**	**0.00%**	3					-	carpets polypropylene

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	46	**11**	**0.00%**	3					-	nz sofa leather
6-Apr-10	31	**11**	**0.00%**	3					-	european sofa
1-Apr-10	180	**11**	**0.00%**	2					-	power tools
8-Apr-10	44	**11**	**0.00%**	3					-	car/ opel vectra 2.0l / european 1998/carpet
1-Apr-10	100	**11**	**0.00%**	2					-	cusions pillows
8-Apr-10	36	**11**	**0.00%**	2					-	car/ lada late 80s russia side trim
1-Apr-10	90	**11**	**0.00%**	2					-	curtain
6-Apr-10	136	**11**	**0.00%**	4					-	furniture beds
6-Apr-10	89	**11**	**0.00%**	3					-	cushions
6-Apr-10	83	**11**	**0.00%**	3					-	curtains/drapes
6-Apr-10	15	**11**	**0.00%**	2					-	foam underlay/modern dunlop
1-Apr-10	67	**11**	**0.00%**	3					-	furniture matress
6-Apr-10	58	**11**	**0.00%**	2					-	flooring wool carpet
7-Apr-10	139	**11**	**0.00%**	2					-	electronics hair dryers
1-Apr-10	103	**10**	**0.00%**	3					-	kids soft toys
8-Apr-10	112	**10**	**0.00%**	2					-	furniture/ sofa/ peru/ cover only
1-Apr-10	121	**10**	**0.00%**	2					-	oil heaters

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	42	**10**	**0.00%**	3					-	footware
6-Apr-10	42	**10**	**0.00%**	3					-	bed fabrics
6-Apr-10	94	**10**	**0.00%**	3					-	carpets polypropylene
1-Apr-10	38	**10**	**0.00%**	3					-	footware
6-Apr-10	90	**10**	**0.00%**	2					-	cushions
7-Apr-10	9	**10**	**0.00%**	2					-	stereo/sony
7-Apr-10	39	**10**	**0.00%**	2					-	electronics tv panasonic/front
8-Apr-10	29	**10**	**0.00%**	2					-	car / ford telstar japan 1996 internal trim panel
7-Apr-10	107	**10**	**0.00%**	4					-	electronics kitchen appliances fridges
8-Apr-10	33	**10**	**0.00%**	2					-	car / ford telstar japan 1996 internal gear trim
6-Apr-10	88	**10**	**0.00%**	3					-	cushions
6-Apr-10	117	**10**	**0.00%**	3					-	furniture sofa
1-Apr-10	30	**10**	**0.00%**	3					-	washing machines
1-Apr-10	142	**10**	**0.00%**	2					-	kitchen appliances toasters
7-Apr-10	61	**10**	**0.00%**	2					-	electronics music stereo
1-Apr-10	149	**10**	**0.00%**	2					-	kitchen appliances irons
7-Apr-10	140	**10**	**0.00%**	2					-	electronics hair dryers

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	129	**10**	**0.00%**	2					-	oil heaters
8-Apr-10	110	**10**	**0.00%**	2					-	furniture/ sofa/
6-Apr-10	45	**10**	**0.00%**	2					-	nzsofa
1-Apr-10	77	**10**	**0.00%**	2					-	duvet
1-Apr-10	146	**9**	**0.00%**	2					-	kitchen appliances sandwich maker
6-Apr-10	93	**9**	**0.00%**	2					-	carpets polypropylene
1-Apr-10	150	**9**	**0.00%**	1					-	kitchen appliances irons
8-Apr-10	23	**9**	**0.00%**	2					-	car /
8-Apr-10	6	**9**	**0.00%**	2					-	roofing /polycarbonate or PVC?
1-Apr-10	65	**9**	**0.00%**	4					-	furniture matress
6-Apr-10	17	**9**	**0.00%**	3					-	wool
6-Apr-10	81	**9**	**0.00%**	2					-	curtains/drapes
7-Apr-10	90	**9**	**0.00%**	2					-	electronics kitchen appliances/dishwasher
1-Apr-10	143	**9**	**0.00%**	2					-	kitchen appliances small grills
7-Apr-10	91	**9**	**0.00%**	2					-	electronics kitchen appliances/dishwasher
1-Apr-10	182	**9**	**0.00%**	2					-	ironing boards
1-Apr-10	187	**9**	**0.00%**	2					-	carpets

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	81	**9**	**0.00%**	2					-	fuji / subaru legacy/ 1993 / central console
1-Apr-10	96	**9**	**0.00%**	2					-	cushion
6-Apr-10	64	**8**	**0.00%**	3					-	curtains/drapes
6-Apr-10	91	**8**	**0.00%**	2					-	carpets nylon
7-Apr-10	13	**8**	**0.00%**	2					-	electronic desk top
1-Apr-10	136	**8**	**0.00%**	2					-	kitchen appliances
7-Apr-10	179	**8**	**0.00%**	2					-	electronic fan heaters
7-Apr-10	59	**8**	**0.00%**	2					-	electronics music stereo
7-Apr-10	86	**8**	**0.00%**	2					-	electronics kitchen appliances/dishwashers
1-Apr-10	45	**8**	**0.00%**	2					-	clothes
1-Apr-10	29	**8**	**0.00%**	2					-	washing machines
7-Apr-10	40	**8**	**0.00%**	1					-	electronics tv panasonic/front
8-Apr-10	136	**8**	**0.00%**	3					-	furniture/ dining chairs
1-Apr-10	91	**8**	**0.00%**	2					-	curtain
7-Apr-10	35	**8**	**0.00%**	2					-	electronic lap tops
7-Apr-10	193	**8**	**0.00%**	3					-	electrical switches HPM Australia
7-Apr-10	21	**8**	**0.00%**	4					-	electronic desk top

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	115	**8**	**0.00%**	2					-	electronics vacuum cleaners
1-Apr-10	101	**8**	**0.00%**	2					-	cusions pillows
8-Apr-10	28	**8**	**0.00%**	2					-	car / ford telstar japan 1996 dash panel
7-Apr-10	37	**8**	**0.00%**	2					-	electronics tv/lg/front
1-Apr-10	37	**8**	**0.00%**	3					-	footware
7-Apr-10	198	**8**	**0.00%**	3					-	electrical switches
6-Apr-10	63	**8**	**0.00%**	2					-	curtains/drapes
7-Apr-10	102	**7**	**0.00%**	2					-	electronics kitchen appliances fridges
1-Apr-10	35	**7**	**0.00%**	2					-	footware
7-Apr-10	68	**7**	**0.00%**	2					-	electronics music stereo
7-Apr-10	17	**7**	**0.00%**	2					-	electronic desk top
8-Apr-10	64	**7**	**0.00%**	3					-	soil pile
1-Apr-10	108	**7**	**0.00%**	2					-	children toys
8-Apr-10	84	**7**	**0.00%**	2					-	mazda/ astina/1992/ dashboard
7-Apr-10	106	**7**	**0.00%**	3					-	electronics kitchen appliances fridges
7-Apr-10	10	**7**	**0.00%**	2					-	electronic desk top
7-Apr-10	131	**7**	**0.00%**	2					-	electronics irons

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	161	**7**	**0.00%**	2					-	kitchen appliances irons board covers
8-Apr-10	24	**7**	**0.00%**	2					-	car / ford laser door panel
1-Apr-10	74	**7**	**0.00%**	2					-	carpets
1-Apr-10	31	**7**	**0.00%**	2					-	washing machines
1-Apr-10	47	**7**	**0.00%**	2					-	clothes
1-Apr-10	73	**7**	**0.00%**	2					-	carpets
7-Apr-10	111	**7**	**0.00%**	1					-	electronics vacuum cleaners
8-Apr-10	26	**7**	**0.00%**	2					-	car / ford telstar japan 1996 internal trim panel
6-Apr-10	148	**7**	**0.00%**	2					-	electronic lap tops
1-Apr-10	186	**7**	**0.00%**	2					-	bins
6-Apr-10	50	**7**	**0.00%**	3					-	carpet underlay/foam dunlop
7-Apr-10	30	**7**	**0.00%**	2					-	electronic lap tops
7-Apr-10	116	**7**	**0.00%**	2					-	electronics vacuum cleaners
1-Apr-10	130	**7**	**0.00%**	3					-	oil heaters
1-Apr-10	122	**7**	**0.00%**	2					-	oil heaters
6-Apr-10	56	**6**	**0.00%**	2					-	flooring polypropylene
7-Apr-10	166	**6**	**0.00%**	2					-	electronics kettles

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	22	**6**	**0.00%**	2					-	nylon/wool mix
1-Apr-10	95	**6**	**0.00%**	2					-	cushion
1-Apr-10	59	**6**	**0.00%**	2					-	furniture dining seat
1-Apr-10	176	**6**	**0.00%**	2					-	power tools
7-Apr-10	64	**6**	**0.00%**	1					-	electronics music stereo
7-Apr-10	117	**6**	**0.00%**	1					-	electronics vacuum cleaners
7-Apr-10	145	**6**	**0.00%**	1					-	electronics grills
6-Apr-10	79	**6**	**0.00%**	2					-	curtains/drapes
7-Apr-10	149	**6**	**0.00%**	2					-	electronics fryers
8-Apr-10	71	**6**	**0.00%**	2					-	nissan / bluebird/ 1990/ side panel
1-Apr-10	70	**6**	**0.00%**	2					-	carpets
1-Apr-10	203	**6**	**0.00%**	2					-	bulbs plastic holder
1-Apr-10	198	**6**	**0.00%**	13					-	electrical cable
8-Apr-10	63	**5**	**0.00%**	5					-	car/ toyota cramry 1996/
7-Apr-10	29	**5**	**0.00%**	3					-	electronic lap tops
6-Apr-10	18	**5**	**0.00%**	2					-	wool
1-Apr-10	46	**5**	**0.00%**	2					-	clothes

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
1-Apr-10	79	**5**	**0.00%**	3					-	duvet
6-Apr-10	73	**5**	**0.00%**	2					-	curtains/drapes
8-Apr-10	57	**5**	**0.00%**	3					-	car/ toyota cressida 1984 / steering wheel
1-Apr-10	39	**5**	**0.00%**	4					-	footware
7-Apr-10	53	**5**	**0.00%**	2					-	electronics tv back cover panasonic
6-Apr-10	52	**5**	**0.00%**	2					-	carpet underlay/foam dunlop
1-Apr-10	197	**5**	**0.00%**	2					-	lamps halogen
7-Apr-10	191	**5**	**0.00%**	2					-	electrical switches
8-Apr-10	27	**5**	**0.00%**	3					-	car / ford telstar japan 1996 internal trim panel
8-Apr-10	35	**5**	**0.00%**	2					-	car/ lada late 80s russia
7-Apr-10	112	**5**	**0.00%**	2					-	electronics vacuum cleaners
8-Apr-10	155	**5**	**0.00%**	2					-	roofing polycarb
7-Apr-10	105	**5**	**0.00%**	2					-	electronics kitchen appliances fridges
8-Apr-10	154	**5**	**0.00%**	1					-	roofing polycarb
7-Apr-10	125	**5**	**0.00%**	1					-	electronics juicers
1-Apr-10	140	**5**	**0.00%**	3					-	kitchen appliances toasters
1-Apr-10	43	**5**	**0.00%**	2					-	footware

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
7-Apr-10	104	**5**	**0.00%**	2					-	electronics kitchen appliances fridges
8-Apr-10	14	**5**	**0.00%**	2					-	carpet underlay/late 1980's to mid nineties
7-Apr-10	45	**5**	**0.00%**	3					-	electronics tv/sony/front
7-Apr-10	136	**5**	**0.00%**	2					-	electronics irons
1-Apr-10	56	**5**	**0.00%**	4					-	furniture dining seat
8-Apr-10	16	**5**	**0.00%**	3					-	carpet underlay/late 1980's to mid nineties
1-Apr-10	134	**4**	**0.00%**	2					-	kitchen appliances
8-Apr-10	39	**4**	**0.00%**	2					-	car/ opel vectra 2.0l / european dash board 1999
1-Apr-10	168	**4**	**0.00%**	1					-	car seat covers
7-Apr-10	66	**4**	**0.00%**	2					-	electronics music stereo
1-Apr-10	138	**4**	**0.00%**	3					-	kitchen appliances toasters
1-Apr-10	109	**4**	**0.00%**	2					-	children toys
1-Apr-10	172	**4**	**0.00%**	3					-	power tools
1-Apr-10	148	**4**	**0.00%**	2					-	kitchen appliances irons
7-Apr-10	127	**4**	**0.00%**	2					-	electronics steamer
8-Apr-10	19	**4**	**0.00%**	4					-	car /
7-Apr-10	20	**4**	**0.00%**	2					-	electronic desk top

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	146	**4**	**0.00%**	3					-	electronic lap tops
7-Apr-10	14	**4**	**0.00%**	1					-	electronic desk top
1-Apr-10	9	**4**	**0.00%**	2					-	Calibration
7-Apr-10	101	**4**	**0.00%**	2					-	electronics kitchen appliances fridges
7-Apr-10	75	**3**	**0.00%**	1					-	electronics music stereo
7-Apr-10	147	**3**	**0.00%**	2					-	electronics grills
1-Apr-10	58	**3**	**0.00%**	1					-	furniture dining seat
6-Apr-10	14	**3**	**0.00%**	3					-	foam underlay/modern dunlop
1-Apr-10	60	**3**	**0.00%**	2					-	furniture dining seat
6-Apr-10	11	**3**	**0.00%**	2					-	nylon carpet
7-Apr-10	76	**3**	**0.00%**	2					-	electronics music stereo
7-Apr-10	28	**3**	**0.00%**	2					-	electronic lap tops
6-Apr-10	55	**3**	**0.00%**	2					-	flooring wool/nylon
8-Apr-10	135	**3**	**0.00%**	3					-	furniture/ sofa/
7-Apr-10	185	**3**	**0.00%**	2					-	electronic power tools grindet
6-Apr-10	60	**2**	**0.00%**	1					-	flooring underlay
7-Apr-10	109	**2**	**0.00%**	3					-	electronics kitchen appliances fridges

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
6-Apr-10	26	**2**	**0.00%**	3					-	vinyl
8-Apr-10	51	**2**	**0.00%**	4					-	car/ toyota cressida 1984 sidepanel
8-Apr-10	21	**2**	**0.00%**	2					-	car / ford laser 1992 door trim
7-Apr-10	63	**2**	**0.00%**	2					-	electronics music stereo
8-Apr-10	15	**2**	**0.00%**	3					-	carpet underlay/late 1980's to mid nineties
1-Apr-10	40	**1**	**0.00%**	3					-	footware
1-Apr-10	147	**1**	**0.00%**	2					-	kitchen appliances irons
1-Apr-10	116	**1**	**0.00%**	2					-	children toys
7-Apr-10	31	**1**	**0.00%**	2					-	electronic lap tops
7-Apr-10	133	**1**	**0.00%**	7					-	electronics irons
1-Apr-10	8	**1**	**0.00%**	3					-	Calibration
1-Apr-10	88	**0**	**0.00%**	3					-	curtain
7-Apr-10	183	**0**	**0.00%**	4					-	electronic power tools drill
6-Apr-10	140	**0**	**0.00%**	6					-	furniture dining seat
8-Apr-10	18	**0**	**0.00%**	3					-	car /
			0.00%						-	Elto single power point V/EPVI EB313-V/ 107062/ 9421007789445
			0.00%						-	Elto S power point hori/EPHI SEB313- / 107064/ 9421007789469

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
			0.00%						-	Elto V double pow pt/EPH2 EB316-V/ 107066/ 9421007789483
			0.00%						-	Elto V single switch /ESV1 EB302-V/ 106988/ 9421007789407
			0.00%						-	Elto V double switch/ESV2 EB304-V/ 106989/ 9421007789414
			0.00%						-	Elto V triple switch/ESV3 EB306-V/ 107060/ 9421007789421
6-Apr-10	105		**0.00%**						-	
6-Apr-10	106		**0.00%**						-	
7-Apr-10	155	**0**	**0.00%**	4					-	electronics toasters
6-Apr-10	16	**-1**	**0.00%**	2					-	nylon
8-Apr-10	156	**-2**	**0.00%**	7					-	roofing polycarb
1-Apr-10	32	**-2**	**0.00%**	6					-	washing machines
7-Apr-10	135	**-3**	**0.00%**	5					-	electronics irons
7-Apr-10	128	**-4**	**0.00%**	4					-	electronics steamer
7-Apr-10	130	**-7**	**0.00%**	6					-	electronics mixer
8-Apr-10	123	**-7**	**0.00%**	8					-	furniture/ sofa/
8-Apr-10	65	**-14**	**0.00%**	5					-	burnt pile
8-Apr-10	53	**-20**	**0.00%**	5					-	car/ toyota cressida 1984
1-Apr-10	162	**-45**	**0.00%**	6					-	petrol cans

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
8-Apr-10	144	**-46**	**0.00%**	6					-	furniture/ dining chairs
8-Apr-10	121	**-47**	**0.00%**	8					-	furniture/ sofa/
6-Apr-10	28	**-50**	**0.00%**	7					-	wall board mount
6-Apr-10	19	**-51**	**-0.01%**	7					-	nylon/pvc/outdoor carpet
7-Apr-10	52	**-2704**	**-0.27%**	81					-	electronics tv back cover panasonic
			0.56%						-	
	Samples for further analysis								-	
									-	
9-Apr-10	53	**193871**	**19.4%**	10914					-	electrical power board hpm china/ bfr 11
9-Apr-10	31	**172866**	**17.3%**	9335					-	tv backing / bfr 1
9-Apr-10	55	**170923**	**17.1%**	8573					-	electrical power board hpm chinese
9-Apr-10	52	**160135**	**16.0%**	7869					-	electrical power board hpm chins
9-Apr-10	30	**159878**	**16.0%**	8470					-	tv backing
9-Apr-10	56	**99697**	**10.0%**	4281					-	thermal fax cover/ bfr 13
9-Apr-10	39	**89907**	**9.0%**	4994					-	printer circuit board / bfr 2
9-Apr-10	50	**79014**	**7.9%**	3174					-	electrical bulb ge energy saver / bfr 9
9-Apr-10	54	**69591**	**7.0%**	2444					-	printer cartridge hp / bfr 12

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
9-Apr-10	37	**65069**	**6.5%**	3316					-	printer circuit board
9-Apr-10	34	**58841**	**5.9%**	2000					-	printer
9-Apr-10	38	**19122**	**1.9%**	1301					-	printer circuit board
9-Apr-10	43	**6923**	**0.7%**	194					-	car child seat / polystrene/ bfr 5
9-Apr-10	41	**4068**	**0.4%**	103					-	toyota camfry /car seat/ bfr 3
9-Apr-10	44	**3626**	**0.4%**	136					-	expol under floor insulation/ bfr 6
9-Apr-10	51	**3272**	**0.3%**	53					-	electrical plug elta chinese/ bfr 10
9-Apr-10	59	**3206**	**0.3%**	59					-	car seat foam only
9-Apr-10	47	**3159**	**0.3%**	58					-	electrical switch chinese
9-Apr-10	49	**2804**	**0.3%**	51					-	electrical switch chinese/ bfr 8
9-Apr-10	48	**2631**	**0.3%**	45					-	electrical switch chinese
9-Apr-10	60	**2529**	**0.3%**	46					-	car seat cover with foam/ bfr 14
9-Apr-10	42	**1659**	**0.2%**	41					-	toyota car hood lining/ bfr 4
9-Apr-10	57	**1311**	**0.1%**	28					-	car seat cover only
9-Apr-10	46	**1208**	**0.1%**	23					-	sofa cover / charles parsons / bfr 7
9-Apr-10	61	**976**	**0.1%**	22					-	car seat cover only
9-Apr-10	66	**944**	**0.1%**	21					-	car side panel lining

Date of reading	Reading No	Bromine reading	Estimated % Br	Br +/-	Category	Average Bromine value	Estimated Sample Wgt (g)	Avg Wgt	Estimated wgt of BDE in sample (g)	Sample description / product number
9-Apr-10	45	**903**	**0.1%**	19					-	furniture sofa cover charls parsons
9-Apr-10	33	**873**	**0.1%**	17					-	printer
9-Apr-10	58	**822**	**0.1%**	18					-	car seat cover only
9-Apr-10	40	**767**	**0.1%**	18					-	fire alarm
9-Apr-10	63	**760**	**0.1%**	18					-	car seat cover only
9-Apr-10	64	**682**	**0.1%**	17					-	car seat cover only
9-Apr-10	62	**567**	**0.1%**	14					-	car seat cover only
9-Apr-10	67	**34**	**0.0%**	4					-	car seat cover only
9-Apr-10	65	**10**	**0.0%**	2					-	car seat cover only
9-Apr-10	36	**7**	**0.0%**	3					-	printer
9-Apr-10	35	**7**	**0.0%**	2					-	printer
9-Apr-10	32	**2**	**0.0%**	2					-	lights

Appendix N Excel spreadsheets entitled ‘NZ Statistics data giving categories with raw data’

Grouped	Lighters	Lighters		Total Lighters
	9613100000 Lighters; pocket, cigarette, gas fuelled, non-refillable	9613200000 Lighters; pocket, cigarette, gas fuelled, refillable	9403700001 Furniture; plastic, domestic, tables	9613100000 Lighters; pocket, cigarette, gas fuelled, non-refillable
	Quantity	Quantity	Quantity	Quantity
1988	751,596	70,891	17,700	822,487
1989	1,826,745	106,002	18,262	1,932,747
1990	1,127,911	109,587	32,604	1,237,498
1991	786,298	73,447	45,750	859,745
1992	1,638,453	62,630	85,182	1,701,083
1993	1,754,790	149,972	53,563	1,904,762
1994	2,287,811	376,491	44,388	2,664,302
1995	1,574,308	253,968	35,775	1,828,276
1996	1,868,973	315,394	35,446	2,184,367
1997	1,660,314	306,349	39,264	1,966,663
1998	3,935,877	295,135	40,587	4,231,012
1999	7,941,746	254,691	25,598	8,196,437
2000	5,784,693	89,887	32,201	5,874,580
2001	5,918,326	55,874	32,820	5,974,200
2002	6,379,025	82,768	41,197	6,461,793
2003	8,463,214	107,203	30,092	8,570,417
2004	5,825,533	69,460	41,804	5,894,993
2005	8,048,985	109,774	48,635	8,158,759
2006	7,599,241	136,351	61,074	7,735,592
2007	7,444,281	217,388	60,017	7,661,669
2008	7,715,947	115,841	34,490	7,831,788
2009	5,912,782	82,212	37,642	5,994,994

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	PCB	PCB	Total PCB	Electrical fuses
	8534000001 Circuits; printed, for use with television broadcast receivers or radio broadcast receivers	8534000009 Circuits; printed, for use with apparatus other than television broadcast receivers or radio broadcast receivers	8534000009 Circuits; printed, for use with apparatus other than television broadcast receivers or radio broadcast receivers	8535100001 Electrical apparatus; fuses, of plastics, for a voltage exceeding 1000 volts
	Quantity	Quantity		Quantity
1988	102,988	353,002	455,990	1,212
1989	17,349	206,092	223,441	2,736
1990	6,634	130,440	137,074	**43**
1991	265	173,742	174,007	**99**
1992	71	334,089	334,160	**7**
1993	395	518,334	518,729	**..**
1994	932	1,073,102	1,074,034	**17**
1995	352	1,275,504	1,275,856	**61**
1996	50	1,229,360	1,229,410	1,890
1997	426	1,446,062	1,446,488	11,406
1998	1,295	1,325,958	1,327,253	1,913
1999	76,957	2,324,616	2,401,573	1,480
2000	423	4,561,951	4,562,374	1,753
2001	32	4,670,991	4,671,023	**5**
2002	47	6,047,794	6,047,841	1,100
2003	120	7,279,311	7,279,431	1,946
2004	145	9,862,555	9,862,700	4,352
2005	4,882	9,102,778	9,107,660	1,813
2006	6,372	7,943,239	7,949,611	1,797
2007	63	8,879,490	8,879,553	24,662
2008	2,758	7,731,692	7,734,450	4,253
2009	11,388	7,606,039	7,617,427	1,875

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Circuit breakers	Circuit Breakers	Total circuit breakers
	8535210000 Electrical apparatus; automatic circuit breakers, for a voltage exceeding 1000 volts but less than 72.5kV	8535290000 Electrical apparatus; automatic circuit breakers, for a voltage of 72.5kV or more	8535210000 Electrical apparatus; automatic circuit breakers, for a voltage exceeding 1000 volts but less than 72.5kV
	Quantity	Quantity	
1988	28,909	28,123	57,032
1989	36,349	1,671	38,020
1990	31,255	5,766	37,021
1991	46,584	7,191	53,775
1992	34,170	3,353	37,523
1993	21,393	927	22,320
1994	21,944	382	22,326
1995	18,298	4,184	22,482
1996	18,646	2,056	20,702
1997	6,859	1,385	8,244
1998	8,355	490	8,845
1999	11,782	301	12,083
2000	6,288	8,154	14,442
2001	2,150	1,002	3,152
2002	8,425	448	8,873
2003	4,413	7,147	11,560
2004	11,393	33,631	45,024
2005	9,883	31,430	41,313
2006	3,899	14,353	18,252
2007	2,158	45,238	47,396
2008	1,882	1,531	3,413
2009	3,020	9,509	12,529

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Isolating Switches	Isolating Switches	Total for all countries Isolating Switches
	8535300001 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity not exceeding 35 amperes	8535300009 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity between 36 and 100 amperes	8535300019 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity exceeding 100 amperes
	Quantity	Quantity	Quantity
1988	109,918	25,172	100,834
1989	926,244	12,109	57,974
1990	46,094	4,869	107,757
1991	23,367	5,394	72,390
1992	55,734	2,393	94,299
1993	192,241	4,439	22,514
1994	374,476	9,779	13,374
1995	100,287	6,086	12,529
1996	82,784	15,384	7,289
1997	61,607	39,628	4,829
1998	66,722	3,334	26,834
1999	39,347	5,149	25,618
2000	22,645	4,084	20,682
2001	58,948	4,766	16,675
2002	75,559	4,018	21,051
2003	16,274	3,745	8,197
2004	8,140	980	10,488
2005	18,912	1,842	9,406
2006	18,147	1,507	13,501
2007	8,629	2,174	12,621
2008	61,804	91,395	11,172
2009	13,995	110,347	12,582

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Total isolating switches	Lightnig arresters	Electrical apparatus
	8535300001 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity not exceeding 35 amperes	8535400000 Electrical apparatus; lightning arresters, voltage limiters and surge suppressors, for a voltage exceeding 1000 volts	8535900901 Electrical apparatus; for making and breaking electrical circuits, fuse switchgear (for a voltage exceeding 1000 volts)
		Quantity	Quantity
1988	235,924	511,210	2,692
1989	996,327	424,974	2,465
1990	158,720	70,415	69
1991	101,151	29,754	74
1992	152,426	19,178	500
1993	219,194	111,027	62
1994	397,629	44,409	1
1995	118,902	40,396	12
1996	105,457	42,838	26
1997	106,064	32,877	..
1998	96,890	34,629	55
1999	70,114	33,225	260
2000	47,411	40,758	1
2001	80,389	52,656	2
2002	100,628	55,597	9
2003	28,216	111,467	29
2004	19,608	201,925	1,815
2005	30,160	353,126	12
2006	33,155	138,407	45
2007	23,424	184,859	166
2008	164,371	208,750	95
2009	136,924	786,269	523

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Electrical apparatus	Electrical apparatus	Electrical apparatus	Electrical apparatus
	8535900909 Electrical apparatus; for making and breaking electrical circuits, relays and contractors (for a voltage exceeding 1000 volts)	8535901900 Electrical apparatus; for making connections to or in electrical circuits, for a voltage exceeding 1000 volts, n.e.c. in item no. 8535.90	8536100101 Electrical apparatus; fuses, plastic, having a rated capacity not exceeding 800 amperes, for use in circuits not exceeding 600 volts, (for a voltage not exceeding 1000 volts)	8536100901 Electrical apparatus; fuses, of plastics, for a voltage not exceeding 1000 volts, n.e.c. in item no. 8536.10
	Quantity	Quantity	Quantity	Quantity
1988	108,290	1,338,046	553,815	157,835
1989	157,968	804,364	790,086	213,194
1990	63,886	672,143	954,563	93,922
1991	33,682	443,104	820,874	100,199
1992	9,272	238,649	754,509	40,659
1993	22,361	311,748	693,413	27,161
1994	11,524	290,737	796,405	119
1995	17,678	56,448	415,303	16
1996	39,041	189,871	268,375	440
1997	49,944	117,523	364,205	11
1998	25,133	158,906	244,972	..
1999	22,862	27,816	220,383	1
2000	23,904	8,624	252,784	7,095
2001	73,340	15,004	162,739	30,639
2002	59,212	52,053	343,709	11,504
2003	70,903	69,595	1,003,706	7,096
2004	40,755	36,129	1,150,554	8,138
2005	61,407	295,082	593,656	8,578
2006	153,890	95,022	852,593	22,863
2007	126,342	313,393	1,007,488	506
2008	218,202	241,262	967,626	20,869
2009	183,235	196,844	840,974	85

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Electrical apparatus	Electrical apparatus	Total Electrical apparatus other	Insulators
	8536200000 Electrical apparatus; automatic circuit breakers, for a voltage not exceeding 1000 volts	8536300000 Electrical apparatus; for protecting electrical circuits, n.e.c. in heading no. 8536, for a voltage not exceeding 1000 volts	8535900901 Electrical apparatus; for making and breaking electrical circuits, fuse switchgear (for a voltage exceeding 1000 volts)	8546900100 Electrical insulators; automotive, of materials other than glass or ceramics
	Quantity	Quantity		Quantity
1988	459,333	355,650	2,975,661	170,720
1989	670,168	293,003	2,931,248	1,481,570
1990	617,021	128,455	2,530,059	586,967
1991	372,729	484,415	2,255,077	474,277
1992	825,983	607,890	2,477,462	34,297
1993	2,100,047	363,718	3,518,510	112,805
1994	1,486,875	795,854	3,381,515	30,635
1995	1,333,974	1,133,689	2,957,120	7,894
1996	1,377,426	349,015	2,224,194	7,888
1997	1,424,618	353,107	2,309,408	20,429
1998	1,471,659	203,131	2,103,856	85,959
1999	1,346,399	285,939	1,903,660	22,559
2000	1,470,262	209,254	1,971,924	93,240
2001	1,116,837	468,939	1,867,500	62,182
2002	1,244,210	1,152,761	2,863,458	102,046
2003	1,351,351	1,804,454	4,307,134	110,249
2004	1,923,517	1,492,070	4,652,978	94,231
2005	1,723,900	1,564,091	4,246,726	41,667
2006	2,799,770	474,375	4,398,558	17,504
2007	5,455,910	479,940	7,383,745	74,020
2008	1,789,093	433,974	3,671,121	2,692
2009	1,159,488	409,787	2,790,936	3,224

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Insulators	Total Insulators	IC's	IC's	Total IC's	Hair Dryer
	8546900900 Electrical insulators; other than automotive, of materials other than glass or ceramics	8546900100 Electrical insulators; automotive, of materials other than glass or ceramics	8542100000 Electronic integrated circuits; cards incorporating an electronic integrated circuit (smart cards)	8542110000 Electronic circuits; monolithic integrated, digital	8542100000 Electronic integrated circuits; cards incorporating an electronic integrated circuit (smart cards)	8516310001 Hair-dressing apparatus; electro-thermic hair dryers
	Quantity		Quantity	Quantity		Quantity
1988	84,116	254,836	..	777,235	**777235**	**..**
1989	68,812	1,550,382	..	440,280	**440280**	**..**
1990	298,887	885,854	..	1,183,656	**1183656**	**..**
1991	302,153	776,430	..	1,274,714	**1274714**	**..**
1992	361,257	395,554	..	2,072,314	**2072314**	**..**
1993	275,909	388,714	..	3,106,211	**3106211**	**..**
1994	529,916	560,551	..	5,207,162	**5207162**	**..**
1995	343,419	351,313	..	8,140,902	**8140902**	**..**
1996	968,016	975,904	..	0	**0**	99,845
1997	1,159,796	1,180,225	..	..	**0**	166,613
1998	1,430,102	1,516,061	..	..	**0**	112,547
1999	1,227,786	1,250,345	..	..	**0**	149,445
2000	2,476,180	2,569,420	..	..	**0**	151,190
2001	4,875,092	4,937,274	..	..	**0**	120,092
2002	1,833,343	1,935,389	4,921,726	..	**4921726**	182,247
2003	1,646,636	1,756,885	4,299,601	..	**4299601**	245,216
2004	5,537,776	5,632,007	7,924,869	..	**7924869**	198,802
2005	4,083,065	4,124,732	4,475,519	..	**4475519**	167,948
2006	3,793,832	3,811,336	3,933,788	..	**3933788**	198,453
2007	2,253,081	2,327,101	..	..	**0**	203,535
2008	1,408,426	1,411,118	..	..	**0**	258,135
2009	765,750	768,974	..	..	**0**	206,257

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV	Large TV	Large TV
	8528100025 Television receivers; colour, mounted in cabinets, with screen size exceeding 660mm but not exceeding 710mm	**8528100027 Television receivers; colour, mounted in cabinets, with screen size exceeding 710mm but not exceeding 760mm**	**8528100033 Television receivers; colour, mounted in cabinets, with screen size exceeding 760mm but not exceeding 860mm**	**8528100034 Television receivers; colour, mounted in cabinets, with screen size exceeding 860mm but not exceeding 900mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	..
1993	..	..	..	..
1994	2,363	7,786	480	2
1995	8,000	33,891	3,301	1,043
1996	0	0	0	0
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV	Large TV	Large TV
	8528100037 Television receivers; colour, mounted in cabinets, with screen size exceeding 900mm but not exceeding 1000mm	**8528100058 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 660mm but not exceeding 710mm**	**8528100059 Television receivers; colour, (other than mounted in cabinets), screen size exceeding 560mm**	**8528100061 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 710mm but not exceeding 760mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	2,059	..
1993	..	..	4,111	..
1994	..	5	1,283	932
1995	83	1,587	..	1,584
1996	0	0	..	0
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV	Large TV	Large TV
	8528100063 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 760mm but not exceeding 860mm	**8528100064 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 860mm but not exceeding 900mm**	**8528100067 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 900mm but not exceeding 1000mm**	**8528100068 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 1000mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	..
1993	..	..	..	..
1994	73	16	62	258
1995	37	53	61	419
1996	0	0	0	0
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV
	8528120015 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 660mm but not exceeding 710mm	**8528120017 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 710mm but not exceeding 760mm**
	Quantity	**Quantity**
1988	..	..
1989	..	..
1990	..	..
1991	..	..
1992	..	..
1993	..	..
1994	..	..
1995	..	..
1996	9,119	36,397
1997	6,412	39,030
1998	4,522	40,302
1999	3,153	51,196
2000	17,781	35,106
2001	14,693	32,787
2002	5,829	70,072
2003	6,039	88,068
2004	9,540	79,650
2005	14,165	67,928
2006	15,187	42,954
2007		
2008		
2009		

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV	Large TV
	8528120019 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 760mm but not exceeding 860mm	**8528120021 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 860mm but not exceeding 900mm**	**8528120023 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 900mm but not exceeding 1000mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	7,813	1,301	51
1997	5,040	2,009	31
1998	4,086	3,020	59
1999	5,001	5,309	..
2000	3,731	4,853	1
2001	6,898	5,019	616
2002	15,373	4,705	872
2003	11,766	6,709	1,259
2004	23,223	2,518	703
2005	37,446	7,351	2,692
2006	40,462	235	4,733
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV	Large TV
	8528120029 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 1000mm	**8528120043 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 660mm but not exceeding 710mm**	**8528120045 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 710mm but not exceeding 760mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	185	513	1,091
1997	617	1,359	181
1998	1,622	816	1,713
1999	2,758	1,058	2,187
2000	3,002	531	3,244
2001	2,287	523	3,227
2002	4,563	608	5,373
2003	15,207	603	6,849
2004	20,291	8,689	7,888
2005	37,065	12,147	4,517
2006	54,460	8,095	2,339
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	Large TV	Large TV
	8528120047 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 760mm but not exceeding 860mm	**8528120049 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 860mm but not exceeding 900mm**	**8528120051 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 900mm but not exceeding 1000mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	1	5	2
1997	1	2	1
1998	84	735	1
1999	410	735	179
2000	300	357	26
2001	283	1	37
2002	515	1	5
2003	1,942	5	394
2004	3,745	5	506
2005	3,622	2	644
2006	5,510	4	2,077
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Large TV	TOTAL LARGE TV	Small TV	Small TV
	8528120059 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 1000mm	**8528100025 Television receivers; colour, mounted in cabinets, with screen size exceeding 660mm but not exceeding 710mm**	**8528100001 Television receivers; colour, mounted in cabinets, with screen size not exceeding 330mm**	**8528100003 Television receivers; incorporating video recording or reproducing apparatus**
	Quantity		**Quantity**	**Quantity**
1988	..	**0**	..	..
1989	..	**0**	..	..
1990	..	**0**	..	..
1991	..	**0**	..	..
1992	..	**2059**	4,967	..
1993	..	**4111**	1,534	..
1994	..	**13260**	1,070	861
1995	..	**50059**	..	5,218
1996	606	**57084**	..	0
1997	351	**55034**	..	..
1998	385	**57345**	..	..
1999	967	**72953**	..	..
2000	1,078	**70010**	..	..
2001	1,033	**67404**	..	..
2002	1,874	**109790**	..	..
2003	2,348	**141189**	..	..
2004	6,392	**163150**	..	..
2005	9,171	**196750**	..	..
2006	18,717	**194773**	..	..
2007		**0**		
2008		**0**		
2009		**0**		

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100005 Television receivers; colour, mounted in cabinets, with screen size exceeding 330mm but not exceeding 360mm	**8528100007 Television receivers; colour, mounted in cabinets, with screen size not exceeding 330mm**	**8528100011 Television receivers; colour, mounted in cabinets, with screen size exceeding 360mm but not exceeding 460mm**	**8528100013 Television receivers; colour, mounted in cabinets, with screen size exceeding 330mm but not exceeding 360mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	71,084	..	1,727	..
1993	61,274	..	3,490	..
1994	59,581	3,782	2,746	27,069
1995	..	2,526	..	58,684
1996	..	0	..	0
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100015 Television receivers; colour, mounted in cabinets, with screen size exceeding 460mm but not exceeding 510mm	**8528100016 Television receivers; colour, mounted in cabinets, with screen size exceeding 360mm but not exceeding 460mm**	**8528100017 Television receivers; colour, mounted in cabinets, with screen size exceeding 460mm but not exceeding 510mm**	**8528100018 Television receivers; colour, mounted in cabinets, with screen size exceeding 510mm but not exceeding 560mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	30,802	..	..	..
1993	36,646	..	..	..
1994	28,659	4,068	14,633	15,332
1995	..	20,068	45,484	39,466
1996	..	0	0	0
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100021 Television receivers; colour, mounted in cabinets, with screen size exceeding 510mm but not exceeding 560mm	**8528100023 Television receivers; colour, mounted in cabinets, with screen size exceeding 560mm but not exceeding 660mm**	**8528100029 Television receivers; colour, mounted in cabinets, with screen size exceeding 560mm**	**8528100031 Television receivers; colour; (other than mounted in cabinets), screen size not exceeding 330mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	34,192	..	49,085	667
1993	28,326	..	42,720	2,424
1994	27,277	8,050	48,767	560
1995	..	30,615	..	..
1996	..	0	..	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100035 Television receivers; colour, (other than mounted in cabinets), screen size exceeding 330mm but not exceeding 360mm	**8528100041 Television receivers; colour, (other than mounted in cabinets), screen size exceeding 360mm but not exceeding 460mm**	**8528100043 Television receivers; colour, mounted in cabinets, with screen size exceeding 1000mm**	**8528100045 Television receivers; colour, (other than mounted in cabinets), screen size exceeding 460mm but not exceeding 510mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	8,650	41	..	2,060
1993	11,082	31	..	1,502
1994	10,978	68	421	6,191
1995	..	..	93	..
1996	..	..	0	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100046 Television receivers; colour, (other than mounted in cabinets), with screen size not exceeding 330mm	**8528100047 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 330mm but not exceeding 360mm**	**8528100048 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 360mm but not exceeding 460mm**	**8528100051 Television receivers; colour, (other than mounted in cabinets), screen size exceeding 510mm but not exceeding 560mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	11,162
1993	..	..	..	10,840
1994	111	8,807	165	3,498
1995	4,524	8,303	8	..
1996	0	0	0	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100052 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 460mm but not exceeding 510mm	**8528100053 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 510mm but not exceeding 560mm**	**8528100057 Television receivers; colour, (other than mounted in cabinets), with screen size exceeding 560mm but not exceeding 660mm**	**8528100069 Television receivers; other than broadcast, n.e.s. in item no. 8528.10.00**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	42,062
1993	..	..	..	63,211
1994	3,691	1,764	847	54,639
1995	7,607	2,936	1,654	..
1996	0	0	0	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100079 Television receivers; other than broadcast receivers, n.e.s. in item no. 8528.10.00	**8528100101 Television broadcast receivers; (video monitors, projectors), colour, cabinet mounted, screen size 360mm or less, with or without radio receivers, sound or video recording or reproducing apparatus**	**8528100102 Television broadcast receivers; colour, whether or not in same housing with radio broadcast receivers or sound/video apparatus, in cabinets with screen size not over 330mm**	**8528100105 Television broadcast receivers; colour, whether or not in same housing with radio broadcast receivers or sound/video apparatus, in cabinets with screen size over 330mm but not over 360mm**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	..	76,909	..	..
1989	..	45,610	..	..
1990	..	10,037	13,460	65,951
1991	..	..	12,997	49,699
1992	..	..	0	0
1993	..	..	..	..
1994	9,112	..	..	..
1995	51,615	..	..	..
1996	0	..	..	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528100109 Television broadcast receivers; (video monitors, projectors), colour, cabinet mounted, screen size 361mm to 460mm, with or without radio receivers, sound or video recording or reproducing apparatus	**8528100111 Television broadcast receivers; (video monitors, projectors), colour, cabinet mounted, screen size 461mm to 510mm, with or without radio receivers, sound or video recording or reproducing apparatus**	**8528100119 Television broadcast receivers; (video monitors, projectors), colour, cabinet mounted, screen size 511mm to 560mm, with or without radio receivers, sound or video recording or reproducing apparatus**
	Quantity	**Quantity**	**Quantity**
1988	20,001	17,345	17,268
1989	35,267	31,101	33,016
1990	31,850	38,197	17,219
1991	15,678	40,729	29,779
1992	0	0	0
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	..	..	..
1997	..	..	..
1998	..	..	..
1999	..	..	..
2000	..	..	..
2001	..	..	..
2002	..	..	..
2003	..	..	..
2004	..	..	..
2005	..	..	..
2006	..	..	..
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528100129 Television broadcast receivers; (video monitors, projectors), colour, cabinet mounted, screen size exceeding 560mm, with or without radio receivers, sound or video recording or reproducing apparatus	**8528100131 Television broadcast receivers; (video monitors, projectors), colour, not cabinet mounted, screen size 360mm or less, with or without radio receivers, sound or video recording or reproducing apparatus**	**8528100132 Television broadcast receivers; colour, whether or not in same housing with radio broadcast receivers or sound/video apparatus, not in cabinets, screen size not over 330mm**
	Quantity	**Quantity**	**Quantity**
1988	4,425	4,391	..
1989	15,106	2,085	..
1990	24,391	506	1,046
1991	40,558	..	640
1992	0	..	0
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	..	..	..
1997	..	..	..
1998	..	..	..
1999	..	..	..
2000	..	..	..
2001	..	..	..
2002	..	..	..
2003	..	..	..
2004	..	..	..
2005	..	..	..
2006	..	..	..
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528100135 Television broadcast receivers; colour, whether or not in same housing with radio broadcast receivers or sound/video apparatus, not in cabinets, screen size over 330mm but not over 360mm	**8528100139 Television broadcast receivers; (video monitors, projectors), colour, not cabinet mounted, screen size 361 to 460mm, with or without radio receivers, sound or video recording or reproducing apparatus**	**8528100141 Television broadcast receivers; (video monitors, projectors), colour, not cabinet mounted, screen size 461 to 510mm, with or without radio receivers, sound or video recording or reproducing apparatus**
	Quantity	**Quantity**	**Quantity**
1988	..	466	88
1989	..	3	1,693
1990	8,544	2	787
1991	10,647	3	6,874
1992	0	0	0
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	..	..	..
1997	..	..	..
1998	..	..	..
1999	..	..	..
2000	..	..	..
2001	..	..	..
2002	..	..	..
2003	..	..	..
2004	..	..	..
2005	..	..	..
2006	..	..	..
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV	Small TV
	8528100149 Television broadcast receivers; (video monitors, projectors), colour, not cabinet mounted, screen size 511 to 560mm, with or without radio receivers, sound or video recording or reproducing apparatus	**8528100159 Television broadcast receivers; (video monitors, projectors), colour, not cabinet mounted, screen size exceeding 560mm, with or without radio receivers, sound or video recording or reproducing apparatus**	**8528100900 Television broadcast receivers; (video monitors, projectors), colour, n.e.s. in heading no. 8528, with or without radio receivers, sound or video recording or reproducing apparatus**	**8528120001 Television receivers; colour, incorporating video recording or reproducing apparatus**
	Quantity	**Quantity**	**Quantity**	**Quantity**
1988	20	878	979	..
1989	2,024	486	1,636	..
1990	508	893	1,337	..
1991	2,946	3,514	35,939	..
1992	0	0	0	..
1993	..	..	..	..
1994	..	..	..	..
1995	..	..	..	..
1996	..	..	..	3,355
1997	..	..	..	3,822
1998	..	..	..	1,946
1999	..	..	..	2,348
2000	..	..	..	3,040
2001	..	..	..	703
2002	..	..	..	2,016
2003	..	..	..	2,780
2004	..	..	..	4,411
2005	..	..	..	6,104
2006	..	..	..	10,965
2007				
2008				
2009				

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528120003 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size not exceeding 330mm	**8528120005 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 330mm but not exceeding 360mm**	**8528120007 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 360mm but not exceeding 460mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	2,905	45,283	8,520
1997	6,310	48,095	13,113
1998	3,036	28,383	13,412
1999	6,529	25,776	12,237
2000	4,765	31,294	11,916
2001	3,713	25,092	6,813
2002	1,361	29,352	18,696
2003	1,462	53,850	18,023
2004	1,100	55,578	19,903
2005	2,075	44,494	15,605
2006	621	55,211	8,600
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528120009 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 460mm but not exceeding 510mm	**8528120011 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 510mm but not exceeding 560mm**	**8528120013 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, mounted in cabinets, with screen size exceeding 560mm but not exceeding 660mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	28,481	40,573	25,844
1997	33,163	35,481	32,685
1998	25,656	28,215	25,260
1999	26,385	31,980	26,930
2000	17,895	37,597	21,333
2001	12,649	41,741	13,018
2002	12,132	61,372	19,564
2003	16,063	75,822	14,145
2004	11,810	81,091	17,853
2005	14,034	61,429	14,942
2006	8,413	70,891	12,551
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528120031 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size not exceeding 330mm	**8528120033 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 330mm but not exceeding 360mm**	**8528120035 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 360mm but not exceeding 460mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	2,222	3,790	36
1997	1,611	6,728	471
1998	3,632	9,797	243
1999	172	13,544	53
2000	3,036	8,714	..
2001	303	9,123	62
2002	1,175	12,050	460
2003	862	7,938	586
2004	1,137	16,846	1,830
2005	2,441	16,485	1,051
2006	2,977	5,887	3,823
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Small TV	Small TV	Small TV
	8528120037 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 460mm but not exceeding 510mm	**8528120039 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 510mm but not exceeding 560mm**	**8528120041 Television receivers; colour, whether or not incorporating radio-broadcast receivers or sound recording or reproducing apparatus, (not mounted in cabinets), with screen size exceeding 560mm but not exceeding 660mm**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	..	..	..
1990	..	..	..
1991	..	..	..
1992	..	..	..
1993	..	..	..
1994	..	..	..
1995	..	..	..
1996	3,475	2,257	403
1997	5,531	2,216	1,201
1998	5,847	2,269	522
1999	8,577	3,135	1,421
2000	1,272	2,817	159
2001	67	3,243	104
2002	234	5,255	27
2003	558	4,707	546
2004	2,447	7,429	76
2005	3,521	8,826	616
2006	4,777	2,729	831
2007			
2008			
2009			

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	TOTAL SMALL TV	Stereo	Stereo	Stereo
	8528100001 Television receivers; colour, mounted in cabinets, with screen size not exceeding 330mm	**8519991100 Sound reproducing apparatus; compact disc players, not incorporating a sound recording device**	**8519991900 Sound reproducing apparatus; n.e.s. in heading no. 8519, not incorporating a sound recording device**	**8519290000 Sound reproducing apparatus; record players with loudspeaker, other than coin or disc-operated, not incorporating a sound recording device**
		Quantity	**Quantity**	**Quantity**
1988	**142770**	24,975	25	1
1989	**168027**	63,614	39	12
1990	**214728**	70,661	26	3,669
1991	**250003**	51,471	455	4
1992	**256499**	81,326	70	12
1993	**263080**	51,241	61	8
1994	**342747**	54,884	42	28
1995	**278801**	64,851	86	5
1996	**167144**	107,811	20,513	22
1997	**190427**	102,836	5,302	15
1998	**148218**	81,378	1,715	72
1999	**159087**	110,937	883	38
2000	**143838**	174,123	974	74
2001	**116631**	142,306	279	13
2002	**163694**	130,262	101	354
2003	**197342**	270,736	1,547	77
2004	**221511**	271,917	14,310	68
2005	**191623**	226,674	36,960	887
2006	**188276**	127,184	66,230	746
2007	**0**	..	..	..
2008	**0**	..	..	..
2009	**0**	..	..	..

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Stereo	Stereo	Stereo	TOTAL STEREO
	8519812919 Sound reproducing apparatus; using magnetic, optical or semiconductor media, cassette-type (not pocket-size), n.e.c. in item no. 8519.81, not incorporating a sound recording device	**8519813500 Sound reproducing apparatus; using magnetic, optical or semiconductor media, compact disc players, not incorporating a sound recording device, n.e.c. in item 8519.20.09**	**8519813900 Sound reproducing apparatus; using magnetic, optical or semiconductor media, not incorporating a sound recording device, n.e.c. in item no. 8519.20, 8519.30, 8519.50 or 8519.81**	**8519991100 Sound reproducing apparatus; compact disc players, not incorporating a sound recording device**
	Quantity	**Quantity**	**Quantity**	
1988	..	..	..	25,001
1989	..	..	..	63,665
1990	..	..	..	74,356
1991	..	..	..	51,930
1992	..	..	..	81,408
1993	..	..	..	51,310
1994	..	..	..	54,954
1995	..	..	..	64,942
1996	..	..	..	128,346
1997	..	..	..	108,153
1998	..	..	..	83,165
1999	..	..	..	111,858
2000	..	..	..	175,171
2001	..	..	..	142,598
2002	..	..	..	130,717
2003	..	..	..	272,360
2004	..	..	..	286,295
2005	..	..	..	264,521
2006	..	..	..	194,160
2007	1,755	54,123	42,050	97,928
2008	110	34,231	13,609	47,950
2009	377	29,122	10,407	39,906

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Electric Heater	Electric Heater	TOTAL ELECTRIC HEATER	Iron
	8516290900 Heating apparatus; electric space heating apparatus (excluding storage heating radiators)	**8516100001 Heaters; electric, instantaneous, domestic, (not exceeding 10kW input rating capacity)**	**8516290900 Heating apparatus; electric space heating apparatus (excluding storage heating radiators)**	**8516400000 Smoothing irons; electric**
	Quantity	**Quantity**		**Quantity**
1988	66,803	..	66,803	85,457
1989	113,067	..	113,067	139,119
1990	127,731	..	127,731	104,791
1991	192,726	..	192,726	156,819
1992	182,888	..	182,888	161,797
1993	180,542	..	180,542	118,716
1994	193,429	..	193,429	140,190
1995	191,923	..	191,923	193,834
1996	246,841	..	246,841	121,396
1997	313,091	33,725	346,816	178,816
1998	317,642	11,501	329,143	110,485
1999	188,538	9,007	197,545	136,106
2000	179,984	3,828	183,812	176,468
2001	286,252	5,260	291,512	145,325
2002	354,965	43,074	398,039	193,934
2003	430,194	2,526	432,720	192,010
2004	489,884	2,405	492,289	230,170
2005	617,012	2,548	619,560	206,441
2006	527,257	3,566	530,823	190,271
2007	624,195	7,835	632,030	230,946
2008	557,050	5,662	562,712	186,878
2009	371,943	24,939	396,882	147,509

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Dishwasher	Chest Freezer	Chest Freezer	Chest Freezer	TOTAL CHEST
	8422110000 Dish-washing machines; of the household type	8418300001 Freezers; domestic, chest, not exceeding 800l capacity	8418300002 Freezers; of the chest type, not exceeding 800l capacity, less than 300l gross internal capacity	8418300005 Freezers; of the chest type, not exceeding 800l capacity, 300l and over gross internal capacity	8418300001 Freezers; domestic, chest, not exceeding 800l capacity
	Quantity	Quantity	Quantity	Quantity	
1988	12,639	159	..	..	159
1989	13,984	790	..	..	790
1990	11,554	624	..	..	624
1991	16,395	1,518	..	..	1,518
1992	20,065	1,933	..	..	1,933
1993	19,229	2,801	..	..	2,801
1994	22,049	2,660	..	..	2,660
1995	24,561	3,249	..	..	3,249
1996	27,403	3,230	..	..	3,230
1997	28,634	0	1,838	1,705	3,543
1998	23,299	..	1,321	1,829	3,150
1999	24,209	..	1,627	2,669	4,296
2000	26,985	..	1,653	2,494	4,147
2001	22,820	..	1,809	2,464	4,273
2002	30,010	..	1,886	3,370	5,256
2003	37,403	..	3,491	4,346	7,837
2004	54,090	..	7,392	4,854	12,246
2005	65,061	..	4,069	4,975	9,044
2006	71,192	..	11,830	5,361	17,191
2007	68,801	..	9,191	3,842	13,033
2008	64,713	..	11,157	4,908	16,065
2009	63,965	..	12,270	5,007	17,277

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	CD Player	CD Player	TOTAL CD Player	Domestic Ovens
	8519813500 Sound reproducing apparatus; using magnetic, optical or semiconductor media, compact disc players, not incorporating a sound recording device, n.e.c. in item 8519.20.09	8519991100 Sound reproducing apparatus; compact disc players, not incorporating a sound recording device	8519813500 Sound reproducing apparatus; using magnetic, optical or semiconductor media, compact disc players, not incorporating a sound recording device, n.e.c. in item 8519.20.09	8516600101 Domestic stoves and ranges; wall ovens, (excluding microwaves)
	Quantity	Quantity		Quantity
1988	..	24,975	24,975	964
1989	..	63,614	63,614	1,950
1990	..	70,661	70,661	3,415
1991	..	51,471	51,471	3,522
1992	..	81,326	81,326	4,247
1993	..	51,241	51,241	3,835
1994	..	54,884	54,884	6,383
1995	..	64,851	64,851	10,140
1996	..	107,811	107,811	16,294
1997	..	102,836	102,836	11,931
1998	..	81,378	81,378	8,138
1999	..	110,937	110,937	13,138
2000	..	174,123	174,123	10,383
2001	..	142,306	142,306	10,312
2002	..	130,262	130,262	16,440
2003	..	270,736	270,736	15,703
2004	..	271,917	271,917	25,675
2005	..	226,674	226,674	31,046
2006	..	127,184	127,184	27,692
2007	54,123	..	54,123	29,066
2008	34,231	..	34,231	25,740
2009	29,122	..	29,122	32,886

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Domestic Ovens	Domestic Ovens	**Total domestic Oven**	Electrical switches	Electrical switches
	8516600109 Domestic stoves and ranges; excluding wall ovens and microwaves	**8516600111 Domestic stoves and ranges; benchtop ovens, (excluding microwaves)**	**8516600101 Domestic stoves and ranges; wall ovens, (excluding microwaves)**	8536500001 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity not exceeding 35 amperes	**8536500009 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity between 36 and 100 amperes**
	Quantity	**Quantity**		Quantity	**Quantity**
1988	16,501	..		4,100,066	163,379
1989	0	918	2,868	4,107,871	176,388
1990	..	1,193	4,608	4,703,058	236,875
1991	..	13,750	17,272	4,916,223	204,255
1992	..	6,127	10,374	6,122,115	313,790
1993	..	8,222	12,057	8,152,715	281,290
1994	..	11,270	17,653	15,222,744	357,862
1995	..	14,980	25,120	12,184,885	240,450
1996	..	19,615	35,909	24,176,001	256,593
1997	..	32,282	44,213	9,419,627	288,751
1998	..	32,897	41,035	9,304,664	202,753
1999	..	24,197	37,335	14,199,941	113,648
2000	..	21,196	31,579	11,516,270	181,265
2001	..	23,160	33,472	10,872,058	296,957
2002	..	29,914	46,354	10,654,013	187,517
2003	..	38,363	54,066	15,196,971	206,301
2004	..	21,685	47,360	15,015,088	298,916
2005	..	24,123	55,169	12,601,387	761,319
2006	..	36,946	64,638	13,649,218	1,271,092
2007	..	42,413	71,479	14,439,635	775,576
2008	..	66,622	92,362	8,959,819	689,017
2009	..	43,380	76,266	6,800,213	402,443

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Electrical switches	Electrical switches	Electrical switches	**Total electrical switches**
	8536500019 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity exceeding 100 amperes	**8536500021 Electrical apparatus; switches, for pressures not exceeding 25 volts, having a rated current carrying capacity not exceeding 35 amperes**	**8536500029 Electrical apparatus; switches, for pressures not exceeding 25 volts, having a current carrying capacity exceeding 35 amperes**	**8536500001 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity not exceeding 35 amperes**
	Quantity	**Quantity**	**Quantity**	
1988	33,823	2,156,155	393,704	6,847,127
1989	80,074	1,771,876	262,274	6,398,483
1990	30,046	2,056,455	40,296	7,066,730
1991	37,880	1,224,886	186,762	6,570,006
1992	78,274	952,247	278,980	7,745,406
1993	70,874	1,041,796	229,684	9,776,359
1994	122,107	2,201,047	87,031	17,990,791
1995	174,562	2,086,838	190,498	14,877,233
1996	77,259	6,286,552	173,985	30,970,390
1997	69,937	1,817,042	283,521	11,878,878
1998	91,919	1,834,853	288,862	11,723,051
1999	87,024	1,845,696	375,341	16,621,650
2000	142,855	2,026,794	414,041	14,281,225
2001	199,440	1,804,821	189,800	13,363,076
2002	920,433	2,310,332	122,668	14,194,963
2003	406,332	2,128,142	102,226	18,039,972
2004	875,006	1,543,581	101,745	17,834,336
2005	251,343	2,351,909	130,452	16,096,410
2006	671,340	2,590,587	174,398	18,356,635
2007	116,679	1,949,258	243,900	17,525,048
2008	115,828	1,636,382	494,438	11,895,484
2009	100,127	1,519,064	280,066	9,101,913

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	transformers	transformers	transformers
	8504320110 Electrical transformers; having a power handling capacity exceeding 1kVA but not exceeding 16kVA, having a rated input voltage exceeding 240 volts (excluding liquid dielectric transformers)	**8504320910 Electrical transformers, having a power handling capacity exceeding 1kVA but not exceeding 16kVA, having a rated input voltage not exceeding 240 volts (excluding liquid dielectric transformers)**	**8504330010 Electrical transformers; having a power handling capacity exceeding 16kVA but not exceeding 500kVA (excluding liquid dielectric transformers)**
	Quantity	**Quantity**	**Quantity**
1988	..	..	..
1989	113	47,573	151
1990	1,047	12,658	898
1991	728	10,301	832
1992	1,229	4,258	218
1993	831	9,250	2,294
1994	682	7,059	588
1995	5,503	1,821	1,183
1996	936	1,158	2,182
1997	4,621	2,966	1,564
1998	2,772	13,043	769
1999	1,423	10,372	900
2000	497	24,206	2,541
2001	643	33,313	9,486
2002	84,225	18,902	1,242
2003	183,151	24,113	1,361
2004	360,172	17,342	1,772
2005	283,517	42,947	10,291
2006	25,753	35,161	33,651
2007	73,097	41,585	24,780
2008	209,749	29,890	3,515
2009	296,328	26,242	2,810

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	transformers	Total Transformers	Seats	Seats
	8504340010 Electrical transformers; having a power handling capacity exceeding 500kVA (excluding liquid dielectric transformers)	**8504320110 Electrical transformers; having a power handling capacity exceeding 1kVA but not exceeding 16kVA, having a rated input voltage exceeding 240 volts (excluding liquid dielectric transformers)**	**9401610000 Seats; with wooden frames, upholstered, excluding medical, surgical, dental, veterinary or barber furniture**	**9401610001 Seats; with wooden frames, upholstered, lounge suites, complete, assembled or unassembled**
	Quantity		**Quantity**	**Quantity**
1988	..		10,727	4,160
1989	6	**47843**	..	1,749
1990	3	**14606**	..	3,625
1991	80	**11941**	..	1,918
1992	60	**5765**	..	760
1993	519	**12894**	..	2,837
1994	731	**9060**	..	4,787
1995	464	**8971**	..	4,321
1996	1,000	**5276**	..	10,266
1997	545	**9696**	..	13,391
1998	476	**17060**	..	14,389
1999	752	**13447**	..	17,801
2000	319	**27563**	..	16,895
2001	345	**43787**	..	18,703
2002	223	**104592**	..	22,157
2003	292	**208917**	..	42,432
2004	83	**379369**	..	54,534
2005	1,968	**338723**	..	65,456
2006	1,547	**96112**	..	70,699
2007	1,115	**140577**	..	98,688
2008	5,256	**248410**	..	23,875
2009	3,045	**328425**	..	..

Table information: Quantity = Number, Magnitude = Units (in 1s)

Grouped	Seats	Total Furniture -
	9401710000 Seats; with metal frames, upholstered, (excluding medical, surgical, dental, veterinary or barber furniture)	**9401610000 Seats; with wooden frames, upholstered, excluding medical, surgical, dental, veterinary or barber furniture**
	Quantity	
1988	88,581	103,468
1989	43,714	45,463
1990	37,191	40,816
1991	28,897	30,815
1992	28,395	29,155
1993	42,944	45,781
1994	25,311	30,098
1995	48,318	52,639
1996	73,543	83,809
1997	91,602	104,993
1998	45,389	59,778
1999	48,811	66,612
2000	56,801	73,696
2001	89,180	107,883
2002	97,183	119,340
2003	147,866	190,298
2004	210,690	265,224
2005	261,034	326,490
2006	209,850	280,549
2007	277,929	376,617
2008	233,757	257,632
2009	190,909	190,909

Table information: Quantity = Number, Magnitude = Units (in 1s)

	Total Hairdryers							
	8516310001 Hair-dressing apparatus; electro-thermic hair dryers	8418100001 Refrigerators and freezers; combined refrigerator-freezers with separate external doors, electric or other, domestic	8418100002 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, compression type, less than 200l gross int. cap.	8418100005 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, compression type, 200l and over but less than 300l gross int. cap.	8418100007 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, compression type, 300l and over but less than 400l gross int. cap.	8418100009 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, electric or other, other than domestic	8418100011 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, compression type, 400l and over but less than 500l gross int. cap.	8418100014 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, compression type, 500l and over gross int. cap.
1988	..	44	..	..	..	985	..	..
1989	..	409	..	..	..	2	..	..
1990	..	1,490	..	..	..	14	..	..
1991	..	155	..	..	..	118	..	..
1992	..	204	..	..	..	17	..	..
1993	..	26,498	..	..	..	168	..	..
1994	..	57,129	..	..	..	53	..	..
1995	..	59,800	..	..	..	74	..	..
1996	13	56,144	..	..	..	86	..	..
1997	2,329	0	13,827	28,662	10,172	0	8,097	172
1998	229	..	13,899	14,323	10,387	..	8,318	141
1999	107	..	6,167	10,909	8,811	..	7,938	184
2000	358	..	4,489	7,428	3,984	..	5,442	24
2001	13,063	..	4,476	4,247	7,358	..	7,027	80
2002	96	..	3,025	8,979	6,276	..	6,754	162
2003	52	..	5,447	16,376	10,844	..	5,215	265
2004	299	..	8,684	15,365	15,655	..	5,843	347
2005	369	..	23,297	28,831	19,720	..	10,982	1,907
2006	1,635	..	22,899	27,479	27,569	..	14,065	1,669
2007	262	..	18,022	19,030	22,319	..	15,739	1,448
2008	779	..	20,488	17,907	24,270	..	12,475	2,463
2009	15,706	..	19,159	15,864	21,034	..	15,724	1,080

Table information: Quantity = Number, Magnitude = Units (in 1s)

	8418100016 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, absorption type, electrical	8418100019 Refrigerators and freezers; combined refrigerator freezers, fitted with separate external doors, absorption type, other than electrical	8418100029 Refrig and freezers; combined refrige freezers, fitted with separate extrnal doors, other compression type, other than absorption type	8418210000 Refrigerators; for household use, compression-type, electric or other	8418210001 Refrigerators; for household use, compression type, less than 200l gross internal capacity	8418210003 Refrigerators; for household use, compression type, 200l and over but less than 300l gross internal capacity	8418210005 Refrigerators; for household use, compression type, 300l and over but less than 400l gross internal capacity	8418210007 Refrigerators; for household use, compression type, 400l and over but less than 500l gross internal capacity	8418210012 Refrigerators; for household use, compression type, 500l and over gross internal capacity
1988	..	..	..	46,046	..	..	..	..	..
1989	..	..	..	38,180	..	..	..	..	..
1990	..	..	..	50,509	..	..	..	..	..
1991	..	..	..	45,440	..	..	..	..	..
1992	..	..	..	48,763	..	..	..	..	..
1993	..	..	..	37,068	..	..	..	..	..
1994	..	..	..	22,215	..	..	..	..	..
1995	..	..	..	11,439	..	..	..	..	..
1996	..	..	..	14,524	..	..	..	..	..
1997	..	1	17	0	951	4,736	6,428	81	4
1998	1	203	4	..	6,647	4,771	1,947	..	14
1999	10	..	32	..	15,638	8,677	6,721	4,102	4
2000	324	1	214	..	23,152	13,404	8,566	11,848	60
2001	1,504	..	108	..	30,570	23,665	14,180	4,686	42
2002	161	..	14	..	42,717	16,734	8,151	7,080	61
2003	81	..	2	..	44,601	5,002	1,156	13,817	122
2004	..	..	..	..	33,704	11,231	3,643	9,439	218
2005	5	87	..	..	28,200	8,904	325	1,349	32
2006	6	5	9	..	23,452	8,736	1,262	3,935	41
2007	4	..	43	..	25,476	4,920	2,348	12,526	129
2008	3	2	9	..	26,327	8,418	3,278	12,866	327
2009	3	2	67	..	9,117	3,981	2,302	11,614	102

Table information: Quantity = Number, Magnitude = Units (in 1s)

	8418220000 Refrigerators; for household use, absorption-type, electrical	8418290000 Refrigerators; household, electric or not, other than compression or absorption-type	8418290010 Refrigerators; for household use, absorption-type, electrical	8418290019 Refrigerators; for household use, electric or not, other than compression-type or electrical absorption-type	8418300001 Freezers; domestic, chest, not exceeding 800l capacity	8418300002 Freezers; of the chest type, not exceeding 800l capacity, less than 300l gross internal capacity	8418300005 Freezers; of the chest type, not exceeding 800l capacity, 300l and over gross internal capacity	8418300009 Freezers; (other than domestic), chest, not exceeding 800l capacity	8418400001 Freezers; domestic, upright, not exceeding 900l capacity	8418400002 Freezers; of the upright type, not exceeding 900l capacity, less than 200l gross internal capacity
1988	428	49	..	..	30,225	..	..	114	5,085	..
1989	91	38	..	..	18,453	..	..	242	6,008	..
1990	12	34	..	..	31,977	..	..	358	5,840	..
1991	5	66	..	..	34,564	..	..	24	6,682	..
1992	7	131	..	..	36,384	..	..	29	11,226	..
1993	47	441	..	..	35,230	..	..	609	9,118	..
1994	23	50	..	..	38,093	..	..	807	13,811	..
1995	43	66	..	..	31,899	..	..	4,470	10,070	..
1996	395	96	..	..	30,774	..	..	8,718	12,350	..
1997	43	282	..	..	0	20,492	13,633	0	0	3,551
1998	115	1	..	..	..	20,160	11,351	..	..	1,887
1999	14	202	..	..	..	22,835	10,022	..	..	1,802
2000	3	161	..	..	..	22,221	9,621	..	..	762
2001	2	238	..	..	..	28,788	10,278	..	..	798
2002	57	77	..	..	..	31,568	9,787	..	..	1,127
2003	21	40	..	..	..	41,726	12,104	..	..	1,105
2004	13	13	..	..	..	46,592	16,214	..	..	1,067
2005	14	30	..	..	..	16,069	22,334	..	..	3
2006	27	222	..	..	..	15,431	15,564	..	..	645
2007	..	..	26	100	..	14,649	11,757	..	..	727
2008	..	..	11	170	..	15,228	10,588	..	..	476
2009	..	..	13	93	..	14,656	12,460	..	..	451

Table information: Quantity = Number, Magnitude = Units (in 1s)

	8418400005 Freezers; of the upright type, not exceeding 900l capacity, 200l and over gross internal capacity	8418400009 Freezers; (other than domestic), upright, not exceeding 900l capacity	Total Fridges/ 8418100001 Refrigerators and freezers; combined refrigerator-freezers with separate external doors, electric or other, domestic	8422110000 Dish-washing machines; of the household type	8422190000 Dish-washing machines; of other than household type	Total Dishwashing 8422110000 Dish-washing machines; of the household type	Total Mattresses 9404210000 Mattresses; of cellular rubber or plastics, whether or not covered
1988	..	5	82981	1,786	6	1,792	488
1989	..	144	63567	1,086	16	1,102	2,397
1990	..	21	90255	779	70	849	4,061
1991	..	6	87060	1,258	117	1,375	6,964
1992	..	24	96785	2,726	179	2,905	6,257
1993	..	38	109217	14,058	247	14,305	9,034
1994	..	15	132196	21,891	354	22,245	2,479
1995	..	49	117910	16,408	223	16,631	328
1996	..	4	123091	22,779	286	23,065	582
1997	7,391	0	118540	28,180	142	28,322	764
1998	8,544	..	102713	55,773	1,251	57,024	171
1999	13,795	..	117863	63,784	1,523	65,307	425
2000	14,277	..	125981	58,705	1,239	59,944	379
2001	15,031	..	153078	81,236	1,235	82,471	1,135
2002	16,603	..	159333	103,624	1,863	105,487	1,828
2003	21,026	..	178950	134,011	1,917	135,928	2,804
2004	17,499	..	185527	171,401	1,504	172,905	1,794
2005	953	..	163042	137,360	1,570	138,930	31,703
2006	18,362	..	181378	162,565	2,339	164,904	34,355
2007	21,425	..	170688	129,758	2,472	132,230	28,477
2008	19,013	..	174319	90,282	2,273	92,555	60,448
2009	18,300	..	146022	12,435	1,834	14,269	107,424

Table information: Quantity = Number, Magnitude = Units (in 1s)

Harmonised Trade - Exports (Annual)

Total for all countries

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917220000 Plastics; tubes, pipes and hoses thereof, rigid, of polymers of propylene	3917230000 Plastics; tubes, pipes and hoses thereof, rigid, of polymers of vinyl chloride	3917290100 Plastics; tubes, pipes and hoses thereof, rigid, of hardened proteins	3917291100 Plastics; tubes, pipes and hoses thereof, rigid, of polycarbonates	3917291900 Plastics; tubes, pipes and hoses thereof, rigid, of acrylic polymers	3917292901 Plastics; tubes, pipes and hoses thereof, rigid, of regenerated cellulose	3917292909 Plastics; tubes, pipes and hoses thereof, rigid, of plastics n.e.c. in heading no. 3917	3917310001 Plastics; tubes, pipes and hoses, of polymers of ethylene, flexible, having a minimum burst pressure of 27.6MPa
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	2,672	1,044,106	671	283	2,164	27	12,793	6,514
1989	214,290	675,142	26,591	..	3,089	..	35,579	21,284
1990	8,018	757,005	14,543	..	1,599	..	17,977	42,693
1991	1,828	1,378,404	1,647	..	379	..	133,415	896
1992	2,577	2,120,358	48,970	136	1,316	..	62,859	..
1993	9,944	1,800,018	74,303	..	15	..	59,938	..
1994	5,866	876,008	110,387	200	29	..	29,694	..
1995	24,888	1,194,105	63,940	..	287	..	45,935	..
1996	515	1,062,923	14,830	3	159	..	15,548	..
1997	1,566	1,478,657	21	481	..	..	131,653	..
1998	1,014	1,054,778	425	..	..	..	825,240	..
1999	1,645	1,736,918	..	20	..	..	34,492	..
2000	10,118	1,036,927	..	..	450	308	44,661	..
2001	4,521	1,800,688	270	1,999	..	..	90,492	..
2002	68,924	1,914,141	..	235	..	..	43,524	..
2003	32,864	1,680,752	..	130	..	..	51,629	..
2004	11,814	947,503	..	311	..	..	78,671	..
2005	15,812	2,353,868	..	171	50	..	192,644	..
2006	67,516	931,666	..	899	336	..	438,584	..
2007	165,350	1,757,989	10	2,485	800	..	1,088,170	..
2008	70,725	1,442,764	..	5,656	100	24	680,397	..
2009	21,797	926,738	..	1,112	831	..	376,498	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917310002 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of ethylene, convoluted or corrugated tubes	3917310008 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of ethylene, other than convoluted or corrugated tubes	3917310009 Plastics; tubes, pipes and hoses, of polymers of vinyl chloride, flexible, having a minimum burst pressure of 27.6MPa	3917310011 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of vinyl chloride, convoluted or corrugated tubes	3917310018 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of vinyl chloride, other than convoluted or corrugated tubes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	1,744	..	..
1989	..	..	14,371	..	..
1990	..	..	555	..	..
1991	120	913	14,000	..	10,003
1992	1,251	890	..	539	45,578
1993	2,265	4,467	..	11,748	5,184
1994	1,549	4,830	..	52,849	39,825
1995	331	5,582	..	72,704	61,617
1996	548	29,524	..	43,157	46,418
1997	11,847	39,609	..	40,149	12,093
1998	10,712	9,811	..	75	941
1999	50	27,973	..	4,094	16,966
2000	..	23,850	..	1,269	26,652
2001	2,140	34,025	..	189	118,806
2002	170	27,731	..	30	1,214
2003	16,934	1,955	..	..	2,042
2004	36,260	1,135	..	310	3,780
2005	390	6,875	..	5	6,849
2006	..	32,737	..	..	5,007
2007	..	45,309	..	105	2,628
2008	300	28,860	..	100	9,700
2009	320	15,963	..	22	1,268

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917310019 Plastics; tubes, pipes and hoses, of plastics other than polymers of ethylene or of vinyl chloride, flexible, having a minimum burst pressure of 27.6MPa	3917310021 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of propylene, convoluted or corrugated tubes	3917310029 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of propylene, other than convoluted or corrugated tubes	3917310031 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polyamides, convoluted or corrugated tubes	3917310039 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polyamides, other than convoluted or corrugated tubes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	7,788	..	..	..	..
1989	4,971	..	..	..	..
1990	6,795	..	..	..	..
1991	5,876	..	..	780	280
1992	..	2,728	87	32	413
1993	..	..	143	..	40
1994	..	400	..	..	..
1995	..	1,648	4,932	..	..
1996	..	..	..	..	..
1997	..	..	670	..	..
1998	..	..	10	..	..
1999	..	..	..	..	..
2000	..	..	73	..	..
2001	..	..	..	..	..
2002	..	..	14	..	..
2003	..	25	150	..	..
2004	..	..	..	13	..
2005	..	..	748	..	157
2006	..	..	9	1	254
2007	..	2	1	..	326
2008	..	..	44	..	715
2009	..	150	..	..	90

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917310041 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of vinylidine, fluorides, convoluted or corrugated tubes	3917310049 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of polymers of vinylidine, fluorides, other than convoluted or corrugated tubes	3917310059 Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa, of other plastics n.e.c. in item no. 3917.31.00	3917320200 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, unprinted sausage casings	3917320801 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, layflat of polymers of ethylene
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..
1989	..	..	..	5	155
1990	..	..	..	906	30
1991	..	..	5,327	216	0
1992	..	..	4,605	1,082	..
1993	..	..	5,125	2,298	..
1994	..	6,382	663	429	..
1995	20	2,600	2,727	1,828	..
1996	50	1,160	6,015	4,822	..
1997	..	8,752	5,286	1,391	..
1998	..	912	9,026	31,581	..
1999	..	920	715	560	..
2000	..	2,289	1,134	402	..
2001	..	773	42,290	1,398	..
2002	..	283	67,640	500	..
2003	..	5,295	102,098	..	..
2004	..	382	121,986	110	..
2005	..	450	104,476	..	..
2006	..	962	50,892	33	..
2007	..	311	52,807	1,985	..
2008	..	41	18,810	256	..
2009	..	486	54,648	142	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320802 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of ethylene, convoluted or corrugated tubes	3917320805 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of ethylene, not convoluted or corrugated tubes	3917320811 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, layflat of polymers of vinyl chloride	3917320812 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of vinyl chloride, convoluted or corrugated tubes	3917320815 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of vinyl chloride, not convoluted or corrugated tubes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..
1989	..	..	..	..	..
1990	..	..	74	..	..
1991	..	..	0	..	4,156
1992	..	28,864	..	..	360
1993	..	151,465	..	..	1,786
1994	..	193,089	..	..	1,155
1995	..	75,950	..	..	824
1996	850	23,940	..	2,758	4,891
1997	26	53,399	..	..	7,648
1998	7	244,745	..	..	16,563
1999	..	218,866	..	..	3
2000	..	323,705	..	..	960
2001	..	121,732	..	..	973
2002	..	231,820	..	..	7,796
2003	..	327,410	..	30	296
2004	240	434,006	..	..	782
2005	..	500,945	..	..	12,995
2006	..	354,151	..	..	513
2007	..	117,794	..	..	2,960
2008	5,272	38,142	..	10	1,028
2009	608	220,160	..	24	488

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320819 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, layflat of plastics other than polymers of ethylene or vinyl chloride	3917320821 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, other than layflat, of polymers of ethylene	3917320822 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of propylene, convoluted or corrugated tubes	3917320825 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of propylene, not convoluted or corrugated tubes	3917320831 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, other than layflat, of polymers of vinyl chloride
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..
1989	..	10,684	..	..	2,791
1990	381	1,063	..	..	981
1991	0	296	..	..	703
1992	..	..	..	1,028	..
1993	..	..	..	..	..
1994	..	..	185	..	..
1995	..	..	..	..	..
1996	..	..	..	500	..
1997	..	..	..	120	..
1998	..	..	..	..	..
1999	..	..	..	..	..
2000	..	..	..	..	..
2001	..	..	108	..	..
2002	..	..	..	..	..
2003	..	..	..	..	..
2004	..	..	..	..	..
2005	..	..	..	332	..
2006	..	..	..	..	..
2007	..	..	..	60	..
2008	..	..	..	..	..
2009	..	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320832 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polyamides, convoluted or corrugated tubes	3917320835 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polyamides, not convoluted or corrugated tubes	3917320839 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, other than layflat, of plastics other than polymers of ethylene or vinyl chloride	3917320841 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of vinylidine fluorides, convoluted or corrugated tubes	3917320845 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of polymers of vinylidine fluorides, not convoluted or corrugated tubes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..
1989	..	..	4,781	..	..
1990	..	..	510	..	..
1991	380	30	399	..	10
1992	1,927	1,005	..	269	533
1993	32,765	162	..	..	13,826
1994	129	..	..	..	886
1995	21,000	..	..	..	..
1996	5,126	..	..	..	401
1997	18,763	..	..	..	62,367
1998	40	300	..	..	12,040
1999	30	55	..	1	..
2000	..	5,130	..	..	..
2001	..	391	..	..	..
2002	..	384	..	..	..
2003	..	20	..	..	..
2004	..	200	..	..	..
2005	..	..	..	..	..
2006	..	8	..	..	..
2007	..	59	..	..	..
2008	..	2,067	..	..	..
2009	..	5	..	..	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320849 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (other than sausage casings), layflat, of other plastics n.e.c. in item no. 3917.32.08	3917320851 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of ethylene, convoluted or corrugated tubes	3917320855 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of ethylene, not convoluted or corrugated tubes	3917320861 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of vinyl chloride, convoluted or corrugated tubes	3917320865 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of vinyl chloride, not convoluted or corrugated tubes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..
1989	..	..	..	..	..
1990	..	..	..	..	..
1991	8	..	1,101	3,657	4,303
1992	180	18,050	22,749	245	4,529
1993	11,558	35,932	..	817	17,751
1994	..	92,449	..	320	11,318
1995	51	56,870	240,743	2,899	9,709
1996	946	50,816	199,153	484	7,875
1997	1,470	30,684	168,097	75	27,673
1998	50	338,578	8,504	..	43,582
1999	..	29,865	80	..	101,248
2000	10	58,812	135	..	39,336
2001	100	50,927	54	100	81,904
2002	..	22,063	126,961	253	253,959
2003	..	21,593	102,360	60	279,962
2004	500	154,898	10,998	..	226,535
2005	147	8,831	20,204	676	203,080
2006	..	9,663	8,441	2	49,493
2007	8,555	10,616	22,489	6,520	26,379
2008	..	11,425	30,298	31,262	16,589
2009	1,981	..	2,318	800	95,638

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320871 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of propylene, convoluted or corrugated tubes	3917320875 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of propylene, not convoluted or corrugated tubes	3917320881 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polyamides, convoluted or corrugated tubes	3917320885 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polyamides, not convoluted or corrugated tubes	3917320891 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of vinylidine fluorides, convoluted, corrugated tubes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..
1989	..	..	..	..	..
1990	..	..	..	..	..
1991	..	250	..	..	..
1992	..	..	..	25	..
1993	..	4,112	..	20	..
1994	..	130	..	..	..
1995	..	4,890	..	..	..
1996	..	50	..	..	..
1997	..	..	..	..	..
1998	..	1,535	..	..	..
1999	14,832	15,854	..	240	..
2000	28,420	551	..	..	..
2001	17,347	..	..	1,876	..
2002	20,483	..	..	63,500	..
2003	17,101	..	..	40,008	..
2004	6,123	1,126	..	280	..
2005	751	10	..	57,896	..
2006	..	..	..	8,000	..
2007	1,805	15	..	1	..
2008	72,455	1,283	..	60	..
2009	44,289	6	..	..	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320895 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of polymers of vinylidine fluorides, not convoluted or corrugated tubes	3917320899 Plastics; tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings, (not sausage casings, not layflat), of other plastics n.e.c. in item no. 3917.32.08	3917320901 Plastics; tubes, pipes and hoses, layflat, of polymers of ethylene, not reinforced or otherwise combined with other materials, without fittings	3917320909 Plastics; tubes, pipes and hoses, layflat, of polymers of vinyl chloride, not reinforced or otherwise combined with other materials, without fittings	3917320919 Plastics; tubes, pipes and hoses, layflat, of plastics other than polymers or ethylene or vinyl chloride, not reinforced or otherwise combined with other materials, without fittings
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	311	..	5,442
1989	..	..	0	..	0
1990	..	..	..	..	..
1991	88	678	..	..	..
1992	35	3,835	..	..	..
1993	..	6,446	..	..	..
1994	..	1,488	..	..	..
1995	..	5,059	..	..	..
1996	..	15,771	..	..	..
1997	..	26,478	..	..	..
1998	247	12,576	..	..	..
1999	..	6,619	..	..	..
2000	84	2,186	..	..	..
2001	..	14,266	..	..	..
2002	..	103,786	..	..	..
2003	..	36,544	..	..	..
2004	..	14,540	..	..	..
2005	..	10,371	..	..	..
2006	..	12,589	..	..	..
2007	..	19,432	..	..	..
2008	..	80,573	..	..	..
2009	..	67,423	..	..	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917320921 Plastics; tubes, pipes and hoses, of polymers of ethylene, not reinforced or otherwise combined with other materials, without fittings, other than layflat	3917320929 Plastics; tubes, pipes and hoses, of polymers of vinyl chloride, not reinforced or otherwise combined with other materials, without fittings, other than layflat	3917320939 Plastics; tubes, pipes and hoses, of plastics other than polymers of ethylene or vinyl chloride, not reinforced or otherwise combined with other materials, without fittings, other than layflat	3917330000 Plastics; tubes, pipes and hoses thereof, other than those of item no. 3917.31, not reinforced or otherwise combined with other materials, with fittings	3917390100 Plastics; sausage casings, n.e.s. in item no. 3917.30
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	10,529	9,718	5,515	26,506	1,613
1989	0	0	0	88,856	0
1990	..	..	..	85,454	..
1991	..	..	..	156,853	..
1992	..	..	..	105,533	..
1993	..	..	..	108,562	..
1994	..	..	..	78,265	..
1995	..	..	..	327,821	..
1996	..	..	..	525,101	..
1997	..	..	..	67,595	..
1998	..	..	..	83,182	..
1999	..	..	..	43,946	..
2000	..	..	..	59,501	..
2001	..	..	..	79,748	..
2002	..	..	..	179,228	..
2003	..	..	..	116,909	..
2004	..	..	..	123,882	..
2005	..	..	..	107,797	..
2006	..	..	..	65,092	..
2007	..	..	..	77,965	..
2008	..	..	..	72,941	..
2009	..	..	..	40,589	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917390200 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, unprinted sausage casings	3917390801 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, layflat of polymers of ethylene	3917390811 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, layflat of polymers of vinyl chloride	3917390819 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, layflat of plastics other than polymers of ethylene or vinyl chloride	3917390821 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, (other than layflat), of polymers of ethylene	3917390831 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, (other than layflat), of polymers of vinyl chloride
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	..	..
1989	13	954	..	..	467	..
1990	2,305	..	665	243	487	495
1991	286	..	840	..	335	880
1992	132	1,020	10	..	..	19,092
1993	671	..	..	120	..	21,134
1994	997	..	6,001	..	..	2,777
1995	1,008	..	19,983	18	853	1,333
1996	..	1,295	15,448	..	405	15,090
1997	..	2,058	4,100	665	..	24,215
1998	200	..	1,129	285	220	20,162
1999	77	..	35,700	6,018	140	13,301
2000	1,300	13,277	..	1	198	22,019
2001	12,375	4,949	182	142	..	1,721
2002	34,500	9,861	..	..	60	4,920
2003	2,700	6,440	1,256	505	..	9,243
2004	..	6,726	1,650	1,400	1,371	3,578
2005	4	1,020	413	837	30	6,362
2006	2,004	133	1,734	2	3,700	16,322
2007	175	..	1,865	1,048	1,467	2,130
2008	2,123	..	107	82	9,276	3,624
2009	1,550	..	2,011	38	37,440	8,345

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917390839 Plastics; tubes, pipes and hoses, reinforced or combined with other materials, (other than layflat), of plastics other than polymers of ethylene or vinyl chloride	3917390901 Plastics; tubes, pipes and hoses, layflat, of polymers of ethylene, n.e.s. in heading no. 3917	3917390909 Plastics; tubes, pipes and hoses, layflat, of polymers of vinyl chloride, n.e.s. in heading no. 3917	3917390919 Plastics; tubes, pipes and hoses, layflat, of plastics other than polymers of ethylene or vinyl chloride, n.e.s. in heading no. 3917	3917390921 Plastics; tubes, pipes and hoses, of polymers of ethylene, other than layflat, n.e.s. in heading no. 3917	3917390929 Plastics; tubes, pipes and hoses, of polymers of vinyl chloride, other than layflat, n.e.s. in heading no. 3917	3917390939 Plastics; tubes, pipes and hoses, of plastics other than polymers of ethylene or vinyl chloride, other than layflat, n.e.s. in heading no 3917
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	101	110	1,095	..	10	2,705
1989	2,978	0	0	0	..	0	0
1990	1,120	..	..	..	..	..	..
1991	2,250	..	..	..	..	..	..
1992	2,390	..	..	..	..	..	..
1993	41,402	..	..	..	..	..	..
1994	5,351	..	..	..	..	..	..
1995	3,664	..	..	..	..	..	..
1996	8,770	..	..	..	..	..	..
1997	43,947	..	..	..	..	..	..
1998	10,314	..	..	..	..	..	..
1999	58,284	..	..	..	..	..	..
2000	56,522	..	..	..	..	..	..
2001	18,938	..	..	..	..	..	..
2002	3,848	..	..	..	..	..	..
2003	5,221	..	..	..	..	..	..
2004	1,232	..	..	..	..	..	..
2005	3,050	..	..	..	..	..	..
2006	40,685	..	..	..	..	..	..
2007	666,358	..	..	..	..	..	..
2008	847,198	..	..	..	..	..	..
2009	41,225	..	..	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	3917400001 Plastics; tube and pipe fittings (eg joints, elbows, flanges)	3917400002 Plastics; tube and pipe fittings of polymers of ethylene	3917400008 Plastics; tube and pipe fittings of polymers of propylene	3917400009 Plastics; hose fittings (eg joints, elbows, flanges)	3917400011 Plastics; tube and pipe fittings of polymers of vinyl chloride	3917400019 Plastics; tube and pipe fittings of plastics (other than polymers of ethylene, propylene or vinyl chloride)	3917400029 Plastics; hose fittings, n.e.c. in item no. 3917.40.00
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	193,004	..	..	75,929	..	..	..
1989	448,888	..	..	206,026	..	..	..
1990	182,487	..	..	236,954	..	..	..
1991	147,419	..	..	281,647	..	..	..
1992	500	12,326	94,159	29,291	346,664	23,885	53,470
1993	..	19,139	1,883	..	717,786	8,224	30,223
1994	..	2,983	352	..	590,348	14,823	48,939
1995	..	7,493	224	..	411,881	41,834	37,062
1996	..	9,499	746	..	420,602	8,857	11,529
1997	..	24,414	1,635	..	643,075	8,007	50,704
1998	..	9,128	1,891	..	699,735	5,894	110,405
1999	..	1,520	1,003	..	753,659	62,235	96,901
2000	..	254	17,714	..	468,712	114,715	77,916
2001	..	2,633	5,417	..	509,688	69,332	87,386
2002	..	3,587	5,376	..	187,066	230,370	99,420
2003	..	7,309	25,007	..	261,042	133,235	67,644
2004	..	19,477	9,592	..	563,533	423,178	38,798
2005	..	24,190	76,988	..	434,185	303,407	41,740
2006	..	12,026	46,557	..	919,296	263,570	84,929
2007	..	117,142	125,175	..	838,927	471,937	49,885
2008	..	155,227	251,551	..	389,665	469,161	76,751
2009	..	190,017	542,989	..	333,902	262,100	93,114

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	Total Plastic Hoses/ Pipes	3917220000 Plastics; tubes, pipes and hoses thereof, rigid, of polymers of propylene	4009100000 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings	4009110000 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, not reinforced or otherwise combined with other materials, without fittings	4009121100 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, not reinforced or otherwise combined with other materials, with fittings; hydraulic automotive brake hoses	4009121400 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, not reinforced or otherwise combined with other materials, with fittings; hydraulic brake hoses (excluding automotive)	4009121900 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, not reinforced or otherwise combined with other materials, with fittings, other than hydraulic brake hoses
	kgms	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	1,411,350	4,357	..	..	..	..	..
1989	1,761,915	5,800	..	..	..	..	..
1990	1,363,340	3,907	..	..	..	..	..
1991	2,160,653	76,939	..	..	..	..	..
1992	3,065,527	3,742	..	..	..	..	..
1993	3,201,272	18,725	..	..	..	..	..
1994	2,181,096	16,602	..	..	..	..	..
1995	2,754,313	3,624	..	..	..	..	..
1996	2,556,575	3,907	..	..	..	..	..
1997	2,999,390	169,003	..	..	..	..	..
1998	3,565,837	130,069	..	..	..	..	..
1999	3,284,830	20,055	..	..	..	..	..
2000	2,439,591	13,118	..	..	..	..	..
2001	3,179,880	9,994	..	..	..	..	..
2002	3,713,647	..	11,658	..	..	809	9,867
2003	3,355,769	..	4,066	..	..	..	3,283
2004	3,246,920	..	4,418	47	604	2,431	
2005	4,498,756	..	5,167	6	150	2,319	
2006	3,427,806	..	50,262	..	254	1,968	
2007	5,689,037	..	1,019,189	..	162	4,248	
2008	4,826,662	..	3,607,083	1	128	6,627	
2009	3,387,125	..	3,713,928	..	6	1,291	

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	4009200000 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses, reinforced or otherwise combined only with metal, without fittings	4009210000 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined only with metal, without fittings	4009221100 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined only with metal, with fittings; automotive hydraulic brake hoses	4009221400 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined only with metal, with fittings; hydraulic brake hoses (excluding automotive)	4009221900 Rubber; vulcanised (other than hard rubber), tubing, piping, hose and hoses (excluding hydraulic brake hoses), reinforced or otherwise combined only with metal, with fittings	4009300000 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses, reinforced or otherwise combined only with textile materials, without fittings
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	325	..	..	..	..	27,001
1989	1,887	..	..	..	..	9,076
1990	13,034	..	..	..	..	7,989
1991	808	..	..	..	..	3,083
1992	7,454	..	..	..	..	1,011
1993	7,979	..	..	..	..	13,389
1994	7,685	..	..	..	..	7,544
1995	7,613	..	..	..	..	15,267
1996	10,668	..	..	..	..	11,201
1997	11,082	..	..	..	..	9,484
1998	18,504	..	..	..	..	4,355
1999	3,108	..	..	..	..	398
2000	8,225	..	..	..	..	45,989
2001	4,009	..	..	..	..	48,343
2002	..	2,793	..	292	119,502	..
2003	..	2,205	268	120	58,131	..
2004	..	6,647	..	190	1,469	..
2005	..	3,241	..	861	2,762	..
2006	..	6,600	329	2,014	16,760	..
2007	..	4,365	5,427	5,778	621	..
2008	..	4,984	399	547	1,407	..
2009	..	21,446	1,782	2,217	2,422	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	4009310000 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined only with textile materials, without fittings	4009321100 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined only with textile materials, with fittings; automotive hydraulic brake hoses	4009321400 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined only with textile materials, with fittings; hydraulic brake hoses (excluding automotive)	4009321900 Rubber; vulcanised (other than hard rubber), tubing, piping, hose and hoses (excluding hydraulic brake hoses), reinforced with textile materials, with fittings	4009400000 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses, reinforced or otherwise combined with materials other than metal or textile materials, without fittings
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	85
1989	..	..	..	..	1,664
1990	..	..	..	..	475
1991	..	..	..	..	5,599
1992	..	..	..	..	1,206
1993	..	..	..	..	31,192
1994	..	..	..	..	2,535
1995	..	..	..	..	4,370
1996	..	..	..	..	4,994
1997	..	..	..	..	3,524
1998	..	..	..	..	5,455
1999	..	..	..	..	80,131
2000	..	..	..	..	36,476
2001	..	..	..	..	585
2002	33,109	..	4,588	365	..
2003	59,964	..	7,109	1,216	..
2004	49,610	2	6,476	96	..
2005	31,666	..	11,881	466	..
2006	40,535	..	8,773	1,079	..
2007	43,231	1,132	6,729	3,603	..
2008	41,314	22,061	12,595	1,184	..
2009	24,711	2,451	3,993	2,857	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	4009410000 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined with materials other than metal or textiles, without fittings	4009421100 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined with materials other than metal or textiles, with fittings; automotive hydraulic brake hoses	4009421400 Rubber; vulcanised (other than hard rubber), tubing, piping and hoses, reinforced or otherwise combined with materials other than metal or textiles, with fittings; hydraulic brake hoses (excluding automotive)	4009421900 Rubber; vulcanised (other than hard rubber), tubing, piping, hose and hoses (excluding hydraulic brake hoses), reinforced with materials other than metal or textiles, with fittings	4009500100 Rubber; vulcanised (other than hard rubber), hydraulic brake hoses, with fittings, for use in the assembly of motor vehicles, as determined by the minister
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	..	..	..	..	5
1989	..	..	..	..	..
1990	..	..	..	..	..
1991	..	..	..	..	..
1992	..	..	..	..	..
1993	..	..	..	..	..
1994	..	..	..	..	..
1995	..	..	..	..	..
1996	..	..	..	..	..
1997	..	..	..	..	..
1998	..	..	..	..	..
1999	..	..	..	..	..
2000	..	..	..	..	..
2001	..	..	..	..	..
2002	196	..	608	22,352	..
2003	71,081	1,145	624	13,004	..
2004	233	..	2,805	22,197	..
2005	1,366	..	1,089	60,938	..
2006	2,226	..	207	45,258	..
2007	50,433	6	136	28,880	..
2008	80,897	4	10	4,022	..
2009	23,051	..	186	5,346	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	4009500200 Rubber; vulcanised (other than hard rubber) hydraulic brake hoses, with fittings, for use in assembly of motor vehicles of heading no. 8703 and 8704 (of a g.v.w. not exceeding 3,500kg), as determined by the minister	400950030 Rubber; vulcanised (other than hard rubber) hydraulic brake hoses, with fittings, for use in assembly of motor vehicles of heading no. 8703 and 8704 exceeding 3,500kg, as determined by the minister	4009500400 Rubber; vulcanised (other than hard rubber) hydraulic brake hoses, with fittings, for use in assembly of vehicles n.e.s. in item no. 4009.50, exceeding 10,500kg, as determined by the minister	4009500500 Rubber; vulcanised (other than hard rubber) hydraulic automotive brake hoses, with fittings, other than as determined by the minister	4009500800 Rubber; vulcanised (other than hard rubber) hydraulic brake hoses (excluding automotive), with fittings, other than as determined by the minister
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	3,017	..	216	25,590	2,148
1989	..	..	..	279	9,264
1990	241	438	210	3,095	1,606
1991	66	1	..	25,403	6,625
1992	146	..	..	36,149	1,235
1993	..	..	564	..	7,513
1994	..	6	170	104	247
1995	20	8	726	..	6,143
1996	158	1	79	30	1,102
1997	45	21	..	100	1,414
1998	593	397	..	30	1,852
1999	1,214	16	..	50	1,992
2000	3,100	1,512	..	2	5,421
2001	3	10	..	1,000	3,702
2002	..	..	..	..	..
2003	..	..	..	..	..
2004	..	..	..	..	..
2005	..	..	..	..	..
2006	..	..	..	..	..
2007	..	..	..	..	..
2008	..	..	..	..	..
2009	..	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: units are kg, Quantity = Number, Magnitude = Units (in 1s)	4009501901 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses reinforced with wire or wire braid, textile and similar strengthening materials (excluding hydraulic brake hoses), with fittings	4009501909 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses, n.e.s. in item no. 4009.50, with fittings	Total Rubber pipes/ hoses 4009100000 Rubber; vulcanised (other than hard rubber), tubes, pipes and hoses, not reinforced or otherwise combined with other materials, without fittings
	Quantity	**Quantity**	Qty
1988	703	3,231	66,678
1989	1,279	860	30,109
1990	2,569	10,271	43,835
1991	31,317	5,572	155,413
1992	61,913	5,906	118,762
1993	257,351	7,161	343,874
1994	432,830	19,854	487,577
1995	258,745	70,277	366,793
1996	147,522	68,979	248,641
1997	153,552	115,627	463,852
1998	69,229	43,839	274,323
1999	30,680	48,721	186,365
2000	82,860	39,729	236,432
2001	11,360	3,388	82,394
2002	..	..	206,139
2003	..	..	222,216
2004	..	..	97,225
2005	..	..	121,912
2006	..	..	176,265
2007	..	..	1,173,940
2008	..	..	3,783,263
2009	..	..	3,805,687

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)			Total Circuit Breakers			Total PCB	Total Fuses	
	8535210000 Electrical apparatus; automatic circuit breakers, for a voltage exceeding 1000 volts but less than 72.5kV	8535290000 Electrical apparatus; automatic circuit breakers, for a voltage of 72.5kV or more	8535210000 Electrical apparatus; automatic circuit breakers, for a voltage exceeding 1000 volts but less than 72.5kV	8534000001 Circuits; printed, for use with television broadcast receivers or radio broadcast receivers	8534000009 Circuits; printed, for use with apparatus other than television broadcast receivers or radio broadcast receivers	8534000001 Circuits; printed, for use with television broadcast receivers or radio broadcast receivers	8535100001 Electrical apparatus; fuses, of plastics, for a voltage exceeding 1000 volts	8535300001 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity not exceeding 35 amperes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	5,053	82,939	87,992	400	328,068	328,468	700	31,173
1989	2,144	2,722	4,866	..	511,098	511,098	1,656	11,364
1990	210	2,849	3,059	27	528,123	528,150	140	2,142
1991	24	29,472	29,496	..	977,387	977,387	1,728	5,960
1992	28	51,278	51,306	..	511,939	511,939	2,548	63,369
1993	68	51,467	51,535	..	860,374	860,374	449	6,907
1994	473	108,892	109,365	14	3,396,301	3,396,315	3,508	157
1995	181	151,873	152,054	4	3,931,305	3,931,309	507	6,255
1996	711	55,655	56,366	60	3,724,391	3,724,451	228	1,348
1997	231	59,031	59,262	2	3,967,786	3,967,788	1,957	1
1998	267	76,960	77,227	..	3,558,675	3,558,675	1,165	672
1999	157	34,654	34,811	4	1,522,283	1,522,287	..	5,537
2000	463	33,833	34,296	137	51,727	51,864	1,705	1,159
2001	786	1	787	81	63,073	63,154	..	275
2002	19	1,773	1,792	180	391,608	391,788	70	36,115
2003	28	18	46	50	443,777	443,827	2,450	1,193
2004	231	582	813	..	443,959	443,959	10	5,717
2005	7,994	679	8,673	..	1,222,046	1,222,046	..	1,193
2006	246	1,350	1,596	144	1,443,396	1,443,540	..	4,252
2007	1,017	539	1,556	20,000	516,204	536,204	..	12,802
2008	158	673	831	100	244,676	244,776	..	1,354
2009	7,619	1,243	8,862	..	112,351	112,351	271	759

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8535300009 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity between 36 and 100 amperes	8535300019 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity exceeding 100 amperes	8535900901 Electrical apparatus; for making and breaking electrical circuits, fuse switchgear (for a voltage exceeding 1000 volts)	8536500001 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity not exceeding 35 amperes	8536500009 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity between 36 and 100 amperes	8536500019 Electrical apparatus; switches, for pressures exceeding 25 volts (but not 1000 volts), having a rated current carrying capacity exceeding 100 amperes
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	84,094	49,045	2,009	772,991	176,124	7,652
1989	1,223	7,164	128	787,523	42,829	2,709
1990	781	1,645	2,810	846,534	3,897	1,809
1991	1,404	2,759	2,514	761,242	23,501	1,759
1992	812	8,629	3	741,717	112,403	3,279
1993	441	539	257	826,403	78,382	92,830
1994	1,594	80	2,076	862,016	512	35,589
1995	2	210	221	1,267,181	710	8,508
1996	1,370	677	200	943,475	2,152	7,379
1997	293	5,128	2	1,301,120	7,106	14,158
1998	523	4,141	500	1,692,482	6,697	12,923
1999	8,544	34	..	1,613,289	12,532	19,328
2000	10,344	100	..	1,758,645	6,692	11,843
2001	2,568	208	172	1,259,781	179,559	15,794
2002	847	153	398	1,164,074	13,282	11,704
2003	5,062	1,426	151	1,457,301	8,408	13,423
2004	1,513	606	5,591	1,772,076	99,006	25,026
2005	3,073	2,130	35,364	1,222,653	22,092	10,179
2006	22	4,066	15,184	1,064,839	33,367	4,207
2007	34	3,515	1,687	962,551	27,684	10,839
2008	1,253	5,086	1,033,878	120,226	34,287	38,316
2009	1,777	30,475	580,253	171,941	25,849	7,745

Harmonised Trade - Exports (Annual)

TOTAL SWITCHES

Table information: Quantity = Number, Magnitude = Units (in 1s)	8536500021 Electrical apparatus; switches, for pressures not exceeding 25 volts, having a rated current carrying capacity not exceeding 35 amperes	8536500029 Electrical apparatus; switches, for pressures not exceeding 25 volts, having a current carrying capacity exceeding 35 amperes	8535300001 Electrical apparatus; isolating switches and make-and-break switches (for a voltage exceeding 1000 volts), having a rated current carrying capacity not exceeding 35 amperes	8536900019 Electrical apparatus; fuse switchgear, for pressures not exceeding 660 volts	8536900031 Electrical apparatus; for switching or protecting electrical circuits or for making connections to or in electrical circuits, for a voltage not exceeding 1000 volts, relays and contactors	8536900032 Electrical apparatus; n.e.s. in heading no. 8536, for switching or protecting electrical circuits, contactors, for a voltage not exceeding 1000 volts	8536900001 Electrical apparatus; wire and cable connectors and the like, for a voltage not exceeding 1000 volts
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	147,280	47,815	1,318,183	2,119	8,753	..	48,259
1989	60,395	16,519	929,854	7,713	46,498	..	63,925
1990	68,545	29,699	957,862	2,113	36,907	707,589	103,432
1991	4,606	27,998	831,743	1,813	..	43,239	1,429,599
1992	2,905	61,271	994,388	..	..	31,562	1,120,590
1993	3,125	172,028	1,180,912	4,924	..	19,142	2,402,243
1994	25,125	107,805	1,034,954	25	..	9,980	420,685
1995	148,881	98,377	1,530,345	83	..	120	638,999
1996	197,436	73,740	1,227,777	672	..	76	631,424
1997	302,137	8,493	1,638,438	786	..	37	651,693
1998	147,581	1,266	1,866,785	126	..	..	3,020,565
1999	176,560	6,789	1,842,613	3,950	..	..	14,292,373
2000	239,905	2,751	2,031,439	1,800	..	..	11,882,585
2001	155,819	5,529	1,619,705	1,036	..	..	1,459,506
2002	62,866	24,526	1,313,965	809	..	..	648,674
2003	50,588	12,738	1,550,290	2,321	..	..	1,500,630
2004	47,787	21,662	1,978,984	1,658	..	..	3,229,769
2005	92,503	39,516	1,428,703	1,349	..	..	962,976
2006	85,234	35,870	1,247,041	575	..	..	629,794
2007	32,958	43,792	1,095,862	603	..	..	909,303
2008	37,329	1,271,729	3,823	..	..	707,772	6,152
2009	17,695	836,765	303	..	..	1,171,235	150,522

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8535900909 Electrical apparatus; for making and breaking electrical circuits, relays and contractors (for a voltage exceeding 1000 volts)	8535901900 Electrical apparatus; for making connections to or in electrical circuits, for a voltage exceeding 1000 volts, n.e.c. in item no. 8535.90	8535400000 Electrical apparatus; lightning arresters, voltage limiters and surge suppressors, for a voltage exceeding 1000 volts	8535290000 Electrical apparatus; automatic circuit breakers, for a voltage of 72.5kV or more	8536100101 Electrical apparatus; fuses, plastic, having a rated capacity not exceeding 800 amperes, for use in circuits not exceeding 600 volts, (for a voltage not exceeding 1000 volts)	8536100901 Electrical apparatus; fuses, of plastics, for a voltage not exceeding 1000 volts, n.e.c. in item no. 8536.10	8536200000 Electrical apparatus; automatic circuit breakers, for a voltage not exceeding 1000 volts
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	47,812	975,406	307	82,939	203,311	..	87,810
1989	16,033	335,184	5,510	2,722	103,541	18,347	9,306
1990	52	367,835	51	2,849	92,319	12,034	1,157
1991	10,652	394,533	13	29,472	67,898	5,805	234
1992	127	1,287,129	984	51,278	98,594	1,873	1,269
1993	5,868	1,311,583	199	51,467	122,340	3,906	1,643
1994	1,198	968,676	517	108,892	107,134	3,409	984
1995	3,923	1,018,887	790	151,873	59,344	10,530	3,171
1996	7,570	511,967	7,564	55,655	54,957	1,465	1,106
1997	465	1,339,706	34	59,031	72,507	1,832	2,274
1998	3,462	705,821	153	76,960	311,609	..	7,560
1999	3,926	676,851	1,576	34,654	151,556	..	81,205
2000	4,205	583,305	2,259	33,833	89,295	32	48,563
2001	2,412	562,151	1,230	1	44,204	10,637	4,603
2002	3,870	366,570	1,503	1,773	17,043	..	23,633
2003	565	260,857	815	18	36,882	208	35,711
2004	4,141	1,289,006	1,433	582	51,141	..	43,009
2005	2,321	197,165	2,675	679	39,533	..	77,871
2006	5,147	389,294	3,367	1,350	44,111	..	19,284
2007	45,678	233,800	15,234	539	26,338	4,000	10,899
2008	270,058	1,966	673	23,808	..	11,684	12,508
2009	242,960	12,028	1,243	8,144	..	13,982	10,500

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8536300000 Electrical apparatus; for protecting electrical circuits, n.e.c. in heading no. 8536, for a voltage not exceeding 1000 volts	8536300000 Electrical apparatus; for protecting electrical circuits, n.e.c. in heading no. 8536, for a voltage not exceeding 1000 volts	8536200000 Electrical apparatus; automatic circuit breakers, for a voltage not exceeding 1000 volts	**Electrical apparatus** 8536900019 Electrical apparatus; fuse switchgear, for pressures not exceeding 660 volts	**Total Insulators** 8546900100 Electrical insulators; automotive, of materials other than glass or ceramics	8542100000 Electronic integrated circuits; cards incorporating an electronic integrated circuit (smart cards)	8542110000 Electronic circuits; monolithic integrated, digital	**Total IC** 8542100000 Electronic integrated circuits; cards incorporating an electronic integrated circuit (smart cards)
	Quantity	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**	**Quantity**
1988	81,318	81,318	87,810	1,707,162	26,200	..	52	52
1989	23,649	23,649	9,306	665,383	..	..	..	0
1990	7,167	7,167	1,157	1,341,829	..	..	19	19
1991	3,057	3,057	234	1,989,606	15,000	..	26	26
1992	8,353	8,353	1,269	2,611,381	..	..	2	2
1993	8,038	8,038	1,643	3,941,034	130	..	66	66
1994	2,708	2,708	984	1,627,900	95	..	64	64
1995	3,775	3,775	3,171	1,898,441	..	..	17,941	17941
1996	22,227	22,227	1,106	1,318,016	810	..	0	0
1997	22,244	22,244	2,274	2,175,127	231	..	..	0
1998	9,113	9,113	7,560	4,152,042	6,064	..	..	0
1999	8,224	8,224	81,205	15,343,744	39	..	..	0
2000	3,939	3,939	48,563	12,702,318	28	..	..	0
2001	11,937	11,937	4,603	2,114,257	68	..	..	0
2002	22,046	22,046	23,633	1,131,600	1,000	2,262,487	..	2262487
2003	9,032	9,032	35,711	1,891,782	50	6,423,545	..	6423545
2004	4,839	4,839	43,009	4,673,426	..	913,364	..	913364
2005	26,211	26,211	77,871	1,414,862	..	754,690	..	754690
2006	9,298	9,298	19,284	1,130,802	..	834,660	..	834660
2007	3,534	3,534	10,899	1,264,361	25,012	..	..	0
2008	12,508	11,684	1,062,636	160	..	..	0	
2009	10,500	13,982	1,635,399	19	..	..	0	

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8504320110 Electrical transformers; having a power handling capacity exceeding 1kVA but not exceeding 16kVA, having a rated input voltage exceeding 240 volts (excluding liquid dielectric transformers)	8504320910 Electrical transformers, having a power handling capacity exceeding 1kVA but not exceeding 16kVA, having a rated input voltage not exceeding 240 volts (excluding liquid dielectric transformers)	Total Transformer 8504320110 Electrical transformers; having a power handling capacity exceeding 1kVA but not exceeding 16kVA, having a rated input voltage exceeding 240 volts (excluding liquid dielectric transformers)	8544110101 Insulated electric conductors; winding wire, of copper, insulated only with lacquer or enamel (not fitted with connectors)	8544110109 Insulated electric conductors; winding wire, of copper, mineral insulated, metal sheathed with copper conductors (whether or not fitted with connectors)
	Quantity	**Quantity**	**Quantity**	**Kgms**	**Kgms**
1988	..	..	0	40,509	1,510
1989	..	7	7	39,264	308
1990	2	1,212	1214	15,955	108
1991	..	12	12	18,699	2,250
1992	3,000	3,437	6437	11,762	..
1993	25	16,643	16668	5,626	1,006
1994	923	7,809	8732	36,973	..
1995	184	4,354	4538	7,318	27
1996	..	2,543	2543	4,917	60
1997	215	2,101	2316	2,806	..
1998	2	352	354	2,595	..
1999	143	262	405	2,564	614
2000	..	1,045	1045	216	..
2001	1	107	108	330	..
2002	56	3,982	4038	55	..
2003	500	24,256	24756	70	111
2004	70	3,628	3698	780	185
2005	21	260	281	14,738	1,968
2006	24	145	169	10,777	6
2007	334	42	376	2,034	31
2008	120	158	278	30	1,703
2009	52	18,098	18150	..	300

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544110900 Insulated electric conductors; winding wire, of copper, n.e.c. in item no. 8544.11.01 (whether or not fitted with connectors)	8544190101 Insulated electric conductors; winding wire, (of other than copper), insulated only with lacquer or enamel (not fitted with connectors)	8544190109 Insulated electric conductors; winding wire, (of other than copper), mineral insulated, metal sheathed with aluminium conductors (whether or not fitted with connectors)	8544190900 Insulated electric conductors; winding wire, (of other than copper), n.e.c. in item no. 8544.19.01 (whether or not fitted with connectors)	8544200001 Insulated electric conductors; co-axial cable and other co-axial electric conductors, fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**	**Kgms**
1988	2,242	2,505	..	1,942	7,403
1989	9,965	80	..	881	11,037
1990	30,065	..	..	205	4,625
1991	11,460	..	..	396	3,640
1992	24,161	..	800	9,756	14,545
1993	79,120	2,530	34	1,409	19,587
1994	3,025	..	..	394	31,593
1995	20,046	600	400	819	4,506
1996	26,632	95	..	898	513
1997	84,039	..	..	40,017	8,143
1998	33,051	1,722	..	10,099	15,109
1999	4,969	..	..	1,013	84,380
2000	6,748	3,257	..	2,915	12,591
2001	1,961	1,711	..	7,125	56,997
2002	5,298	558	..	1,542	26,016
2003	203	709	30	259	12,930
2004	1,402	..	..	15,936	56,488
2005	1,213	2,929	..	1,309	467,346
2006	2,804	5,520	..	3,038	4,508
2007	399	..	..	884	2,170
2008	412	..	..	2,019	4,189
2009	8,031	685	..	1,483	8,549

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544200009 Insulated electric conductors; co-axial cable and other co-axial electric conductors, not fitted with connectors	8544301900 Insulated electric conductors; ignition wiring sets and other wiring sets of a kind used in aircraft or ships	8544410100 Insulated electric conductors; mineral insulated, metal sheathed wire (not winding wire), and cable with conductors of aluminium or copper, for a voltage not exceeding 80 volts, fitted with connectors	8544410901 Insulated electric conductors; communications cable, multipair with solid conductors, for a voltage not exceeding 80 volts, fitted with connectors	8544410909 Insulated electric conductors; communications cable (other than multipair with solid conductors), for a voltage not exceeding 80 volts, fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**	**Kgms**
1988	14,923	5,498	100	..	211,607
1989	9,975	920	3	23	19,515
1990	10,644	..	..	6,118	114,012
1991	11,605	..	2	150	19,112
1992	25,251	..	..	22,188	177,958
1993	7,459	39	120	2,341	33,795
1994	245,115	321	330	690	27,178
1995	7,172	49	22	61	94
1996	11,289	3	115	212	23
1997	8,315	2	84	20	6,481
1998	59,163	641	78	3	410
1999	3,846	246	1,061	20	53
2000	4,365	182	..	..	1,124
2001	9,776	528	..	1,332	238
2002	9,100	190	..	2,326	16
2003	7,466	1,828	8,102	4,589	4,947
2004	58,060	19	110	2,235	67,881
2005	12,857	24	1	873	13,124
2006	11,679	467	20	846	7,703
2007	5,519	4,093	..	..	..
2008	8,127	113	..	..	..
2009	9,289	425	..	..	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544410919 Insulated electric conductors; n.e.s. in heading no. 8544, for a voltage not exceeding 80 volts, fitted with connectors	8544420010 Insulated electric conductors; mineral insulated, metal sheathed wire (not winding wire), and cable with conductors of aluminium or copper, for a voltage not exceeding 80 volts, fitted with connectors	8544420013 Insulated electric conductors; communications cable, multipair with solid conductors, for a voltage not exceeding 80 volts, fitted with connectors	8544420015 Insulated electric conductors; communications cable (other than multipair with solid conductors), for a voltage not exceeding 80 volts, fitted with connectors	8544420017 Insulated electric conductors; for a voltage not exceeding 80 volts, fitted with connectors, n.e.c. in heading no. 8544
	Kgms	**Kgms**	**Kgms**	**Kgms**	**Kgms**
1988	3,894	..	..	..	..
1989	919	..	..	..	..
1990	1,137	..	..	..	..
1991	10	..	..	..	..
1992	934	..	..	..	..
1993	985	..	..	..	..
1994	10,912	..	..	..	..
1995	6,257	..	..	..	..
1996	490	..	..	..	..
1997	11,035	..	..	..	..
1998	19,603	..	..	..	..
1999	40,624	..	..	..	..
2000	81,774	..	..	..	..
2001	5,704	..	..	..	..
2002	49,128	..	..	..	..
2003	6,315	..	..	..	..
2004	10,004	..	..	..	..
2005	15,722	..	..	..	..
2006	13,815	..	..	..	..
2007	..	1,384	1,641	2,920	15,766
2008	..	42	2,723	37,233	21,904
2009	..	359	3,807	26,343	41,532

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544420019 Insulated electric conductors; mineral insulated, metal sheath wire (not winding) and cable, with conductors of aluminium or copper, for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors	8544420021 Insulated electric conductors; communications cable, multipair with solid conductors, for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors	8544420025 Insulated electric conductors; communications cable (other than multipair with solid conductors), for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors	8544420029 Insulated electric conductors; for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors, n.e.c. in heading no. 8544
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	..
1993	..	..	..	..
1994	..	..	..	..
1995	..	..	..	..
1996	..	..	..	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007	610	7	678	48,711
2008	248	10	3,757	34,726
2009	106	60	7,161	452,421

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544490010 Insulated electric conductors; wire (not winding) and cable, insulated only with lacquer or enamel, for a voltage not exceeding 80 volts, not fitted with connectors	8544490013 Insulated electric conductors; mineral insulated metal sheathed wire (not winding) and cable, with conductors of aluminium or copper, for a voltage not over 80 volts, not fitted with connectors	8544490015 Insulated electric conductors; communications cable, multipair with solid conductors, for a voltage not exceeding 80 volts, not fitted with connectors	8544490017 Insulated electric conductors; communications cable, multipair with flexible conductors, for a voltage not exceeding 80 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	..
1993	..	..	..	..
1994	..	..	..	..
1995	..	..	..	..
1996	..	..	..	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007	401	..	93	5,984
2008	..	..	2,637	8,155
2009	..	..	396	1,473

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544490019 Insulated electric conductors; communications cable, (other than multipair with solid or flexible conductors), for a voltage not exceeding 80 volts, not fitted with connectors	8544490021 Insulated electric conductors; for a voltage not exceeding 80 volts, not fitted with connectors, n.e.c. in heading no. 8544	8544490023 Insulated electric conductors; wire (not winding) and cable, insulated only with lacquer or enamel, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490025 Insulated electric conductors; mineral insulated metal sheathed wire (not winding) and cable, with conductors of aluminium or copper, voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	..
1993	..	..	..	..
1994	..	..	..	..
1995	..	..	..	..
1996	..	..	..	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007	1,457,025	26,388	..	437
2008	781,621	1,951	215	8,174
2009	427,033	7,281	1	1,888

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544490027 Insulated electric conductors; multipair, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490029 Insulated electric conductors; individual conductor wires 0.51mm or less in diameter, insulated with plastics, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490031 Insulated electric conductors; individual conductor wires 0.51mm or less in diameter, insulated with rubber, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490033 Insulated electric conductors; individual conductor wires 0.51mm or less in diameter, (insulated with materials n.e.c. in item no. 8544.49), for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	..	..	..
1989	..	..	..	..
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	..
1993	..	..	..	..
1994	..	..	..	..
1995	..	..	..	..
1996	..	..	..	..
1997	..	..	..	..
1998	..	..	..	..
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	..
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	..
2006	..	..	..	..
2007	26,849	41,146	267	..
2008	1,266	34,012	335	329
2009	8,773	148,130	12	1,790

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544490035 Insulated electric conductors; individual conductor wires exceeding 0.51mm in diameter, insulated with plastics, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490037 Insulated electric conductors; individual conductor wires exceeding 0.51mm in diameter, insulated with rubber, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490039 Insulated electric conductors; individual conductor wires exceeding 0.51mm in diameter, (insulated with materials n.e.c. in item no. 8544.49), for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544490101 Insulated electric conductors; wire (not winding) and cable, insulated only with lacquer or enamel, for a voltage not exceeding 80 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	..	..	..
1989	..	..	..	70
1990	..	..	..	..
1991	..	..	..	..
1992	..	..	..	30
1993	..	..	..	45,446
1994	..	..	..	520
1995	..	..	..	..
1996	..	..	..	..
1997	..	..	..	..
1998	..	..	..	4
1999	..	..	..	..
2000	..	..	..	..
2001	..	..	..	9
2002	..	..	..	..
2003	..	..	..	..
2004	..	..	..	..
2005	..	..	..	5,400
2006	..	..	..	..
2007	6,560,440	27,389	101,724	..
2008	8,614,646	2,190	10,128	..
2009	9,471,634	375,881	37,317	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544490109 Insulated electric conductors; metal sheathed wire (not winding) and cable, mineral insulated, with conductors of aluminium or copper, for a voltage not over 80 volts, not fitted with connectors	8544490901 Insulated electric conductors; communications cable, multipair with solid conductors, for a voltage not exceeding 80 volts, not fitted with connectors	8544490909 Insulated electric conductors; communications cable, multipair with flexible conductors, for a voltage not exceeding 80 volts, not fitted with connectors	8544490919 Insulated electric conductors; communications cable, (other than multipair with solid or flexible conductors), for a voltage not exceeding 80 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	..	..	..
1989	1,038	..	..	2,675
1990	..	..	..	..
1991	35	..	..	5,653
1992	..	300	..	554,447
1993	..	..	3,250	1,566,408
1994	..	36,706	..	1,071,108
1995	162	..	..	1,595,176
1996	160	15,612	..	1,584,483
1997	..	..	300	790,596
1998	30	..	..	207,976
1999	..	..	28	399,876
2000	..	..	32	117,145
2001	44	73	9,000	1,485,477
2002	72	3,150	3,100	5,080,658
2003	..	..	..	6,127,168
2004	100	242,964	1,728	4,763,224
2005	..	187,320	2,090	3,601,806
2006	..	330	2,221	3,167,728
2007	..	..	..	..
2008	..	..	..	..
2009	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544490929 Insulated electric conductors; n.e.s. in heading no. 8544, for a voltage not exceeding 80 volts, not fitted with connectors	8544510100 Insulated electric conductors; for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors, mineral insulated, metal sheath wire (not winding) and cable, with conductors of aluminium or copper	8544510901 Insulated electric conductors; communications cable, multipair with solid conductors, for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors	8544510909 Insulated electric conductors; communications cable (other than multipair with solid conductors), for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	110	318	..	21,453
1989	904	..	3	30,688
1990	856	671	..	179,997
1991	12,836	..	..	127
1992	42,758	110	1,960	2,631
1993	266,442	29,096	877	82
1994	47,306	8	..	6,194
1995	1,414	72	..	826
1996	19,227	..	30	6,013
1997	20,949	..	..	3,569
1998	12,631	3,642	..	4,861
1999	5,254	260	5	1,201
2000	60,540	..	..	29,307
2001	13,561	250	..	1,335
2002	25,014	210	499	1,760
2003	6,164	353	..	7,433
2004	9,940	2,535	..	4,574
2005	24,289	56	480	21,048
2006	33,658	60	21	546
2007	..	..	..	..
2008	..	..	..	..
2009	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544510919 Insulated electric conductors; n.e.s. in heading no. 8544, for a voltage exceeding 80 volts but not exceeding 1000 volts, fitted with connectors	8544590101 Insulated electric conductors; wire (not winding) and cable, insulated only with lacquer or enamel, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544590109 Insulated electric conductors; metal sheathed wire (not winding) and cable, mineral insulated, with conductors of aluminium or copper, voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544590901 Insulated electric conductors; multipair, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	18,416	940	2,013	..
1989	2,182	..	..	..
1990	4,593	..	400	16
1991	10,512	..	..	236
1992	8,130	137	..	38
1993	15,064	3,265	23,066	70
1994	3,452	531	12,567	1,900
1995	2,190	..	674	97,904
1996	6,870	615	770	30,679
1997	53,213	174	1,021	1,710
1998	11,061	..	70	351
1999	9,588	..	2	971
2000	22,077	..	110	250
2001	33,060	18,582	..	..
2002	34,838	4,000	..	..
2003	71,477	..	237	401
2004	97,964	..	8,274	1,730
2005	73,521	..	165	8,546
2006	60,372	780	46	7,323
2007	..	..	..	..
2008	..	..	..	..
2009	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544590911 Insulated electric conductors; individual conductor wires 0.51mm or less in diameter, insulated with plastics, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544590919 Insulated electric conductors; individual conductor wires 0.51mm or less in diameter, insulated with rubber, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544590929 Insulated electric conductors; individual conductor wires 0.51mm or less in diameter, (insulated with other than plastics or rubber), for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544590931 Insulated electric conductors; individual conductor wires exceeding 0.51mm in diameter, insulated with plastics, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	166,200	874	145	718,077
1989	780,855	8,560	1,495	1,249,922
1990	491,760	26	..	938,569
1991	222,041	910	350	825,669
1992	514	..	986	600,175
1993	152,385	..	..	748,135
1994	1,565	..	60	662,609
1995	2,234	..	..	423,405
1996	94	495	..	573,669
1997	8,024	1,900	..	1,168,306
1998	2,472	342	..	1,454,562
1999	3,112	937	..	1,720,945
2000	2,397,823	..	..	1,278,541
2001	3,781,824	..	..	920,457
2002	1,550	..	..	939,800
2003	1,410	..	550	2,136,658
2004	3,115	2,109	933	3,175,272
2005	12,304	32	300	5,618,397
2006	40,655	..	1,808	6,745,237
2007	..	..	..	..
2008	..	..	..	..
2009	..	..	..	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544590939 Insulated electric conductors; individual conductor wires exceeding 0.51mm in diameter, insulated with rubber, for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544590949 Insulated electric conductors; individual conductor wires exceeding 0.51mm in diameter, (insulated other than with plastics or rubber), for a voltage exceeding 80 volts but not exceeding 1000 volts, not fitted with connectors	8544600100 Insulated electric conductors; for a voltage exceeding 1000 volts, mineral insulated, metal sheath wire (not winding) and cable with conductors of aluminium or copper	8544600901 Insulated electric conductors; copper conductors, insulated with plastics, for a voltage exceeding 1000 volts, n.e.c. in heading no. 8544
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	..	10,311	..	258,905
1989	81	2,743	..	292,269
1990	376	21,353	4,900	219,051
1991	26	12,279	..	143,719
1992	195	1,785	100	232,675
1993	..	2,705	..	644,369
1994	1,761	2,385	4,953	391,844
1995	405	4,017	1,967	557,862
1996	4,561	203,055	3,500	373,147
1997	150,222	1,036,154	3,224	465,743
1998	162	833,646	1,710	327,388
1999	90	3,579,173	..	529,232
2000	456	235,272	..	518,749
2001	900	4,215	..	1,012,404
2002	1,001	26,735	17	324,806
2003	2,957	22,710	..	169,467
2004	32,062	41,676	1,049	194,151
2005	18,051	8,981	1,500	1,258,847
2006	6,413	14,903	700	2,277,083
2007	..	..	..	1,634,661
2008	..	..	3	707,739
2009	..	..	1,290	1,160,490

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544600909 Insulated electric conductors; copper conductors, insulated with rubber, for a voltage exceeding 1000 volts, n.e.c. in heading no. 8544	8544600919 Insulated electric conductors; copper conductors, (insulated other than with plastics or rubber), for a voltage exceeding 1000 volts, n.e.c. in heading no. 8544	8544600921 Insulated electric conductors; (with conductors of other than copper), insulated with plastics, for a voltage exceeding 1000 volts, n.e.c. in heading no. 8544	8544600929 Insulated electric conductors; (with conductors of other than copper), insulated with rubber, for a voltage exceeding 1000 volts, n.e.c. in heading no. 8544
	Kgms	**Kgms**	**Kgms**	**Kgms**
1988	70	..	150,886	650
1989	326	..	111,533	..
1990	..	25	55,052	..
1991	..	..	287,827	..
1992	..	..	633,027	..
1993	7	..	447,162	845
1994	3,880	..	431,722	..
1995	..	..	455,599	..
1996	..	..	167,550	..
1997	..	..	500,584	..
1998	..	90	637,964	..
1999	..	..	569,415	..
2000	..	..	1,310,014	..
2001	230	64	1,037,214	586
2002	..	900	605,599	..
2003	14,540	..	282,238	..
2004	1,770	2,750	258,625	..
2005	..	899	378,592	620
2006	..	1,433	883,026	..
2007	..	583	1,553,872	..
2008	..	1,117	1,907,746	..
2009	..	58	1,449,678	..

Harmonised Trade - Exports (Annual)

Table information: Quantity = Number, Magnitude = Units (in 1s)	8544600939 Insulated electric conductors; (with conductors of other than copper), (insulated with other than plastics or rubber), for a voltage exceeding 1000 volts, n.e.c. in heading no. 8544	Total Insulated wire 8544110101 Insulated electric conductors; winding wire, of copper, insulated only with lacquer or enamel (not fitted with connectors)
	Kgms	**Kgms**
1988	3,027	1,644,528
1989	16,283	2,594,517
1990	23,684	2,124,198
1991	20,182	1,609,726
1992	11,559	2,378,912
1993	4,272	4,106,997
1994	405	3,038,007
1995	285	3,191,563
1996	455	3,036,232
1997	3,758	4,370,389
1998	7,481	3,648,917
1999	5,345	6,964,824
2000	4,445	6,087,933
2001	14,985	8,419,972
2002	11,442	7,159,380
2003	998	8,892,320
2004	8,213	9,067,858
2005	16,566	11,771,914
2006	14,280	13,319,806
2007	30,937	11,555,043
2008	40,487	12,239,987
2009	10,980	13,664,656