

# **Voluntary Industry Commitment by the US and European Producers of Selected Brominated Flame Retardants covered under OECD's Risk Reduction Programme**

JUNE 30, 1995

VOLUNTARY COMMITMENT BY THE MAJOR GLOBAL PRODUCERS  
OF  
SELECTED BROMINATED FLAME RETARDANTS COVERED  
UNDER OECD'S RISK REDUCTION PROGRAMME

## I. Introduction: A Review By The Major Global Producers Of The Selected Brominated Flame Retardants In Oecd's Risk Reduction Programme

1. The brominated flame retardants included in OECD's Risk Reduction Programme are the polybrominated biphenyls (PBBs), the polybrominated diphenyl oxides (PBDPOs), and tetrabromobisphenol A (TBBPA). The only PBDPOs manufactured and used as flame retardants are the commercial products decabromodiphenyl oxide (DBDPO), octabromodiphenyl oxide (OBDPO), and pentabromodiphenyl oxide (PeBDPO). The PBDPOs and TBBPA are incorporated into a variety of polymers to impart flame retardancy and to enable the polymers to comply with fire standards, within industrial applications ranging from electronic goods to household furnishings and textiles, and thereby enhance consumer safety. DBDPO and TBBPA are the major brominated flame retardants in commercial use today.

2. Of the PBBs, only decabromobiphenyl (DecaBB) remains in commercial use in Europe; its production and use in Europe represents only a very small percentage of today's flame retardant market. Manufacture and use of the PBBs was voluntarily discontinued in the United States in the late 1970s. Manufacture, and therefore use, of the PBBs in the United States can only be resumed upon notification to and approval by the United States Environmental Protection Agency (EPA).

3. The PBDPOs, TBBPA and DecaBB are aromatic organic compounds containing 50% or greater bromine by weight. Because of the difficulty and expense of handling elemental bromine, brominated flame retardants are manufactured in only a few specialized facilities around the world. These products are produced in enclosed processes by the reaction of elemental bromine with the organic substrate. Obviously, well-designed and properly maintained facilities are required when handling bromine. It is highly unlikely that significant amounts of these flame retardants will enter the environment during manufacture.

4. It is similarly unlikely that significant levels of these flame retardants will enter the environment during processing or from flame retarded products. DBDPO, OBDPO, DecaBB and TBBPA are powders, while PeBDPO is a highly viscous liquid; all have negligible solubility in water and very low vapor pressures. These flame retardants are incorporated into polymer systems in enclosed processing equipment (typically extruders or foam machines). Incorporation into the inert matrix of the polymer minimizes the potential for the flame retardant to move into the environment. Laboratory tests have shown that DBDPO is not extracted from polymers under conditions more severe than would be encountered from environmental exposure. TBBPA's primary use as a reactive flame retardant chemically bonds the flame retardant into the polymer backbone.

5. Because of these factors, BFRIP and EBFRIIP members believe that the likelihood of significant human or environmental exposure to these selected flame retardants is minimal. However, the following additional voluntary measures are being taken to further reduce the possibility of negative environmental impact. These voluntary measures are being undertaken by the members of the U.S. Chemical Manufacturers Association (CMA) Brominated Flame Retardant Industry Panel (BFRIP) and the CEFIC European Brominated Flame Retardant Industry Panel (EBFRIP). These two panels represent the major global manufacturers of brominated flame retardants. The member companies of BFRIP and EBFRIIP which are parties to this agreement, including "interested company" or associate members who are manufacturers of the selected flame retardants, are listed in the Appendix to this Annex.

## II. Additional Voluntary Measures

### A. Environmental Exposure

1. BFRIP member companies with manufacturing plants in the United States subscribe to the CMA "Responsible Care" program. The OECD Secretariat has been provided with an overview of CMA's Responsible Care program which Delegates can consult upon request. The Responsible Care program sets high standards of performance for Pollution Prevention, Product Stewardship, Health and Safety, Process Safety, Distribution, and Community Awareness/Emergency Response. Adherence to these standards is a condition of membership in CMA. Special emphasis will be placed on the Product Stewardship and Pollution Prevention codes of practice. United States manufacturing plants have also attained ISO 9002 certification.

2. The goal of Responsible Care's Product Stewardship Code is to make health, safety and environmental protection an integral part of designing, manufacturing, marketing, distributing, using, recycling and disposing of chemical products. The Product Stewardship Code is designed to promote the safe handling of chemicals at all stages - from initial manufacture to distribution, sale and ultimate disposal. The Code emphasizes the need for everyone involved in handling chemicals to do so responsibly, to help maintain a safe and healthy environment. Today's concept of Product Stewardship is a natural outgrowth of various programs that have been developed in the U.S. chemical industry. These practices and programs go by many names, including product safety, product integrity, and product responsibility. However, the Product Stewardship Code broadens industry efforts, particularly in the areas of customer interaction and dialogue about the proper use, handling, recycling and disposal of products.

3. Responsible Care's Pollution Prevention Code is designed to promote industry efforts to protect human health and the environment by reducing waste generation and pollutant emissions. In addition, the Code is designed to encourage and promote sound waste management practices. The Code sets three far-reaching goals: long-term reductions in the amount of all releases to air, water and land; continuous reductions in the amount of wastes generated at facilities; and responsible management of any remaining wastes and releases.

4. EBFRIIP member companies with manufacturing plants in the European Union also adhere to the Responsible Care program under the CEFIC umbrella. As with the CMA's Responsible Care programme, an overview of CEFIC's Responsible Care program has been provided to the OECD Secretariat and Delegates can consult it upon request. The EBFRIIP member with a manufacturing plant in Israel is certified to ISO 9002 standards.

5. BFRIP is initiating during 1995 additional environmental fate studies, specifically biodegradation, to gain further understanding of possible reactions of these products in the environment. Environmental fate studies might be conducted in the future, depending on the results. The selection of which environmental fate

studies to perform is a dynamic process based on the results of previous and ongoing work. See II.B.2. below for additional information on future environmental and chemical fate studies and risk evaluation.

6. BFRIP and EBFRIIP will cooperate with polymer producers and end user manufacturers (such as original equipment and textile manufacturers) on the safe disposal and recycling of polymers containing brominated flame retardants. Environmentally sound waste management options for products containing these selected brominated flame retardants must embrace all of the products' components and not just the brominated flame retardants. Proper recycling of polymers requires consideration of a variety of factors unrelated to these selected brominated flame retardants.

#### B. Toxicity Studies

1. Brominated flame retardant manufacturers, past and present, have conducted extensive studies of the effects of these products. Results from these studies will continue to be provided to regulatory agencies, international organizations and customers, and will continue to be used to set industrial hygiene practices.

2. BFRIP plans additional toxicity studies, as suggested by the World Health Organization's International Program on Chemical Safety reviews, and as might be required by the U.S. EPA and/or the EU. The exact studies to be performed and the timing of those studies, will depend on the programs described below that are currently underway at the U.S. EPA and in the EU.

3. U.S. EPA has proposed that a number of health, chemical fate and environmental effects tests on DBDPO, OBDPO, and PeBDPO are necessary in order to properly evaluate these chemicals. EPA currently is reviewing the exact tests which should be performed; the completion of this review is at EPA's discretion.

4. DBDPO, OBDPO and TBBPA dossiers were submitted to the EU in June 1994 as requested. Formal risk assessments required by the Existing Chemicals Regulation (Council Regulation No. 793/93 of 23 March 1993) are underway on the two flame retardants listed as High Priority Substances, DBDPO and OBDPO. The United Kingdom and France are acting as Lead Countries performing these risk assessments. PeBDPO's dossier is to be submitted in June 1995; the United Kingdom has recommended PeBDPO be placed on the High Priority List and will volunteer to conduct the risk assessment. Additional testing might be required on one or all of these substances as a part of these formal, regulatory agency-performed evaluations. Further, the objective of these assessments is to identify the risks associated with these selected brominated flame retardants, if any, and the points in their life cycles where risk reduction measures might be needed and appropriate.

#### C. Risk Management

1. BFRIP and EBFRIIP members commit that they will not manufacture or import/export the PBBs. The only exception to this commitment is the current manufacture/export of DecaBB by one EBFRIIP member. No other BFRIP or EBFRIIP member manufactures or has an interest in or an intent to manufacture DecaBB. The need for the continued exception for DecaBB will be reviewed in the year 2000 by the manufacturer. Further, DecaBB's manufacturer will supply to OECD a position paper on the toxicology and environmental fate of DecaBB within 12 months after the finalization of this agreement.

2. BFRIP and EBFRIIP members commit not to manufacture or import/export the noncommercial brominated diphenyl oxide congeners as individual flame retardants, except when they are present as part of the commercial DBDPO, OBDPO and PeBDPO products. The noncommercial brominated diphenyl oxide congeners are nona-, hepta-, hexa-, tetra-, tri-, di- and monobromodiphenyl oxide. This commitment is made despite the IPCS conclusion "as bromination levels rise beyond HxBDE, they are increasingly unlikely to

bioaccumulate." (Environmental Health Criteria 162, World Health Organization, International Programme on Chemical Safety, 1994, p. 140.)

3. BFRIP and EBFRIIP members commit to use the best available techniques, without incurring excessive costs, to improve the purity of DBDPO and OBDPO. Specifically, BFRIP and EBFRIIP members subscribe to:

- An average purity of 97% or greater for commercial DBDPO. This commitment will go into effect immediately upon adoption of this voluntary agreement by OECD and the major global producers listed in the Appendix to this Annex.
- Minimizing levels of hexa- and lower brominated diphenyl oxide congeners in commercial OBDPO. Today's commercial OBDPO contains the following congeners:

Decabromodiphenyl oxide	0.0 - 3.0%
Nonabromodiphenyl oxide	8.0 - 14.0%
Octabromodiphenyl oxide	26.0 - 35.0%
Heptabromodiphenyl oxide	43.0 - 58.0%
Hexa/Pentabromodiphenyl oxide	1.4 - 12.0%

- The major global producers of OBDPO listed in the Appendix to this Annex commit to an evaluation of the ways in which the levels of hexa and lower brominated diphenyl oxide congeners in commercial OBDPO can be reduced. This evaluation will be performed within one year of adoption of this voluntary agreement.

4. BFRIP and EBFRIIP members who manufacture PeBDPO commit to use the best available techniques, without incurring excessive costs, to minimize levels of release during manufacture. Further, these manufacturers will regularly review their existing Pollution Prevention and Product Stewardship programs in order to ensure the proper handling, use, and disposal of PeBDPO from manufacture through ultimate disposal.

5. BFRIP and EBFRIIP members commit to minimize environmental exposure of these flame retardants through the appropriate treatment of effluents and emissions from the manufacturing process.

6. BFRIP and EBFRIIP members will continue to issue and regularly update product literature, to educate customers on the safe use of these products. This company-specific product literature includes, but is not limited to Material Safety Data Sheets prepared according to applicable national standards, technical data sheets describing the product and its uses, and summaries of the toxicology data available on the product.

7. BFRIP and EBFRIIP members will use the best information available to regularly evaluate the risks of these brominated flame retardants. Using any new information, BFRIP and EBFRIIP members will seek to minimize risks that are identified by such evaluations.

#### D. Framework

1. CMA and CEFIC will enter into this voluntary agreement on behalf of their BFRIP and EBFRIIP members who are parties to this agreement.

2. BFRIP and EBFVIP members will report to their respective CMA and CEFIC panels at 24-month intervals regarding their compliance with this voluntary agreement. The respective CMA and CEFIC panels then will inform OECD regarding compliance with this voluntary agreement.

APPENDIX

CMA and CEFIC BFRIP and EBFRIIP Panel Members  
Who Are Parties to This Voluntary Agreement

CMA Brominated Flame Retardant Industry Panel

AKZO Chemicals, Inc., Dobbs Ferry, NY

Albemarle Corporation, Baton Rouge, LA

AmeriBrom (a subsidiary of Dead Sea Bromine, Israel), New York, NY

Great Lakes Chemical Corporation, West Lafayette, IN

CEFIC European Brominated Flame Retardant Industry Panel

Albemarle S.A., Brussels, Belgium

Elf Atochem, Paris, France

Eurobrom (a subsidiary of Dead Sea Bromine, Israel), The Netherlands

Great Lakes Chemical (Europe) Ltd., Frauenfeld, Switzerland

14 July 1995

Brominated flame retardants are widely used to make flame retarded synthesized resins, rubbers, elastomers and fibres, all of which are the component materials for various electric and electronic products and parts including computers (essential items in modern society) and for automobiles, vehicles, construction materials and interior decoration materials. They also contribute to the prevention of damage to human and economic resources caused by fire accidents. Recently in Japan, more stringent voluntary regulations than before have been implemented in order to increase the safety of products such as cars and home electric products against fire. In response to such demands, our industry, which supplies flame retardants, has also been making efforts to increase safety against fire.

Currently, DBDPO\*1, OBDPO\*2 and TBBA\*3 are widely used for this purpose because these compounds have excellent characteristics as flame retardants, and also because, due to their high bromine content, a relatively small amount is enough to produce the required effect.

Meanwhile, regarding the environmental effect and safety, it was confirmed by studies based on the "Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances" that bioaccumulation was not high. In addition, these substances have been used world-wide for more than 20 years, and the results of risk evaluation conducted by OECD show that the potential for the occurrence of health and environmental problems is small in each stage of manufacture, the mixing into the resins, the forming and processing and the finishing of the products.

In Japan, PBB's are not commercially manufactured or imported by the voluntary decision of the manufacturers and importers. Furthermore, the commercial production and import of PBDPO's\*5 besides DBDPO and OBDPO, have been abandoned, again by their initiative. Consequently, among the selected brominated flame retardants subject to OECD regulation, only three flame retardants, DBDPO, OBDPO and TBBA, are manufactured, imported and sold inside and outside of Japan.

In Japan, these selected brominated flame retardants are manufactured in a closed system, and the products are manufactured and shipped in adequately controlled facilities. The production facilities are regularly maintained, tested and repaired, halting production for a certain period so that the process is perfectly controlled.

In addition, process and quality control are reviewed as necessary, introducing the most recent technology to assure the uniformity of the products.

Further to the above, these brominated flame retardants are manufactured in certain sections of well-administered chemical plants, and these plants are managed in accordance with the relevant Japanese legislation for the control of the environment and workplace conditions.

Safety information is supplied to the primary users through Manufacturing Safety Data Sheets (MSDS). Safety information from abroad is also freely supplied through workshops, and so on, of the Flame Retardants Conference of Japan.

As stated above, we, the nine members of the committee on the OECD Program of the Flame Retardants Conference of Japan, have properly implemented various measures for risk management. With regard to a long-term vision, we will continue implementing actions based on the Responsible Care Program which is promoted by the Japan Chemical Industry Association, and as we declare below, we

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shall strive to improve risk management based on the OECD discussions on selected brominated flame retardants.

#### Future Actions

### I. Risk management

1. On the initiative of our member companies, we do not and will not manufacture or import PBB's and PBDPO's except DBDPO and OBDPO.
2. Only technology capable of manufacturing products of more than 97% purity (by current analytical methods) will be used for the manufacture of DBDPO.
3. For the manufacture of OBDPO, the concentration of low-brominated substances will be kept to a minimum using practical methods which are either used now or may be developed in the future.
4. For the manufacture of DBDPO, OBDPO and TBBA, the waste products from the production process will be treated and disposed through the best available techniques to minimise release into the environment.
5. The most recent information on the products will be obtained and supplied to the primary users so that they can safely use DBDPO, OBDPO and TBBA.
6. Various actions currently implemented will be continued including complying with relevant legislations, process and product quality control and the supply of required information to the primary users. The most recent theories and techniques will be introduced where applicable to risk management for the selected brominated flame retardants to promote activities for environmental protection and for ensuring safety.

### II. Environmental exposure

7. Maximum effort will be made to prevent contamination and accidents during the manufacture, transport and handling of DBDPO, OBDPO and TBBA.
8. A close relationship will be maintained with the primary users so that DBDPO, OBDPO and TBBA will be used properly and that the waste products will be controlled appropriately to minimise their release into the environment by making the most recent information available.

### III. International cooperation

We will cooperate with international research programs on the toxicity of selected brominated flame retardants.

### IV. Situation reporting

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The progress of these activities will be reported to the Japan Chemical Industry Association every 12 months.

The Flame Retardants Conference of Japan

Member companies of the Committee on the OECD Program

ASAHI GLASS CO., LTD  
ALBEMARLE ASANO CORPORATION  
TEIJIN CHEMICALS LTD  
TOSOH CORPORATION  
NIPPOH CHEMICALS CO., LTD  
BROMOKEN (FAR EAST) LTD  
MANAC Incorporated  
MIKI & Co., LTD  
MITSUI TOATSU FINE CHEMICALS, INC.

Note \*Selected brominated flame retardants are PBBs\*1, PBDPOs\*2 and TBBA\*3 and they are currently under discussion at OECD

\*1 DBDPO: Decabromodiphenyloxide

\*2 OBDPO: Octabromodiphenyloxide

\*3 TBBA: Tetrabromobisphenol A

\*4PBBs: Polybromobiphenyls

\*5 PBDPOs: Polybromodiphenyloxides