

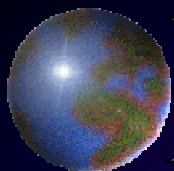


An Update on Decabromodiphenyl Ether

June 23, 2005

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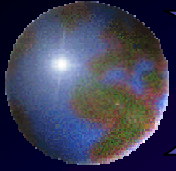


Why use flame retardants?

- The use of flame retardants in plastics improves fire safety
 - ◆ Lives are saved
 - ◆ Injuries are reduced
 - ◆ Economic loss reduced
 - ◆ Reduction of immediate local pollution as a result of fire



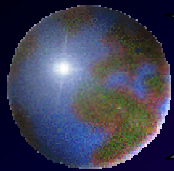
Room Fire: flashover 3 min 10 sec
after starting a fire on sofa



2003 Fire Statistics

- Fire departments went to **1,584,500** fires
- Civilians killed - **3,925**
- Civilians injured - **18,125**
- Direct property loss - **12.3** billion \$
- Structural Fires - **519,500** & **3,365** deaths
 - ◆ **80%** occurred in residential properties
- Vehicle Fires - **312,000** & **465** deaths

Source: *Fire Loss in the United States During 2003*, by Michael J. Karter, Jr.



Fire Testing Results

Upholstered
Sofa
(no FR)



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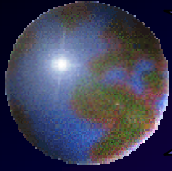


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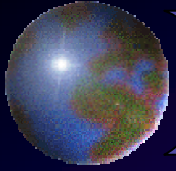
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Source – www.bsef.com



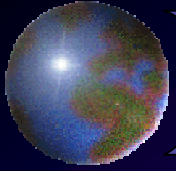
BrFR's Cover A Wide, Diverse Set Of Many Chemicals

- More than 75 different BrFR's
- Environmental/Regulatory Scrutiny Focused Substantially On Only a Few BrFR's:
 - ◆ Polybrominated biphenyls (PBBs):
 - Most production ceased in 1970's, *Industry Voluntarily Stopped Production of the sole remaining product in May 2000*
 - ◆ Polybrominated diphenyl ethers (PBDEs)
 - *Penta-BDE: pentabromodiphenyl ether*
 - *Octa-BDE: octabromodiphenyl ether*
 - *Deca-BDE: decabromodiphenyl ether*



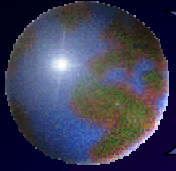
The PBDE Family

- Three commercial products
 - ◆ Penta-, octa- and deca-BDE
- These are quite distinct materials
 - ◆ Penta-BDE – A viscous liquid made up of a complex mixture of different molecules
 - ◆ Deca-BDE – A white crystalline solid > 97% pure



EU Risk Assessment (RA)

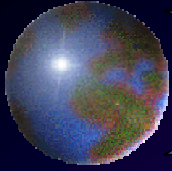
- The most comprehensive assessment of chemicals' environmental and human health impacts
- Products assessed individually, not as a class
- After All Information Generated & Assessed, the EU RA's Lead To:
 - i. There is need for further information and/or testing
 - ii. There is at present no need for risk reduction measures beyond those that are being applied already
 - iii. There is a need for limiting the risks; risk reduction measures that are already being applied shall be taken into account



EU Risk Assessment (RA)

- BrFRs that have completed EU RA:
 - ◆ **Pentabromodiphenyl ether (penta-BDE)** – Used predominately in PU foam, RA was unfavorable, prohibited in the EU as of Aug 15, 2004
 - ◆ **Octabromodiphenyl ether (octa-BDE)** - Some use in auto and EEE applications, RA indicated some risk, prohibited in the EU as of Aug 15, 2004

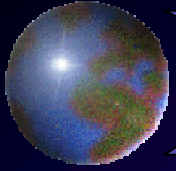
Manufacture of penta- and octa-BDE ceased on Dec 31, 2004



EU Risk Assessment (RA)

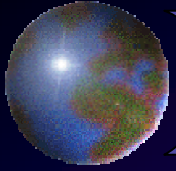
- BrFRs that have completed EU RA:
 - ◆ **Decabromodiphenyl ether (deca-BDE)** – Used in many applications, primarily in EEE, RA closed in May 2004
 - No risk identified
 - No need for risk reduction measures
 - No need for restrictions on marketing

Additional questions are being addressed with a program of testing, monitoring, and emissions control



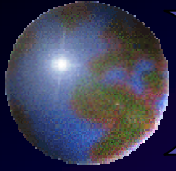
Deca-BDE Risk Assessment

- Ten years of evaluation
- Over one hundred studies
- Detailed evaluation of toxicology by different exposure routes
- Detailed evaluation of eco-toxicity in air, water and terrestrial compartments



Deca-BDE Risk Assessment

- Risk Assessment included evaluation of:
 - ◆ Findings in environment
 - ◆ Levels detected in human blood and breast milk
 - ◆ Potential for debromination or breakdown
- Bottom line – no identified need for risk reduction measures



Additional Flame Retardants Undergoing EU Risk Assessment

■ HBCD

■ TBBPA

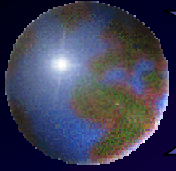
■ Sb_2O_3

■ TCEP

■ TCPP

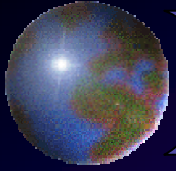
■ TDCP

■ V-6



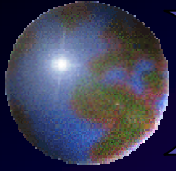
Independent Evaluations on Deca-BDE

- Other independent studies also confirm that deca-BDE can be used in consumer products without concerns for health
 - ◆ *Voluntary Children's Chemical Exposure Program (VCCEP)*
 - ◆ *U.S. National Academy of Science Review: DBDPO (Deca)*
 - ◆ *Consumer Product Safety Commission DBDPO Risk Assessment*
 - ◆ *U.K. Department of Trade and Industry: Risks and Benefits in the Use of Flame Retardants*



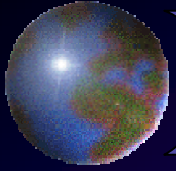
EU ROHS Directive

- Phase-out from July 2006 of Select Substances in EEE:
 - ◆ Lead, mercury, cadmium, hexavalent chromium, PBB's, and PBDE's
- The inclusion of deca-BDE in the RoHS Directive must be reviewed as a “matter of priority” following the outcome of the EU Risk Assessment
- The Risk Assessment Report should enable the EU Commission to exempt deca-BDE from restrictions under the RoHS directive



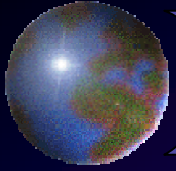
EU ROHS Directive

- The stakeholder consultations on the inclusion of deca-BDE in the RoHS Directive took place the summer of 2004
- The second set of proposed exemptions, which included deca-BDE, was voted on by the EU Commission in April 2005
 - ◆ Majority of countries voted in favour of exemption
 - ◆ Qualified Majority (231 out of 323 votes) not achieved
 - ◆ Up for decision by the European Council of Ministers – discussion on 24th of June 2005?



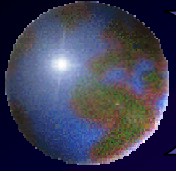
Norway

- In April 2005, Norway proposed a ban on deca-BDE in line with RoHS Directive
 - ◆ However, proposed ban will also cover textile applications & exempt automotive applications
 - ◆ The consultation for the Norway stakeholders ends on Aug 1, 2005
 - ◆ Notification to the European Commission & European Free Trade Association (Notification Nr° 2005/9020/N)
 - ◆ After notification, the Commission & EFTA have until the July 25, 2005 to react and send detailed comments and opinions
 - ◆ Norway needs to comply with EU law if deca-BDE is exempt from RoHS



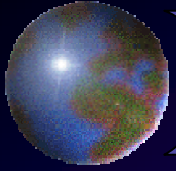
US State Activities

- In 2003, California introduced a bill to ban the use of penta, octa and deca-BDE
- After review of the many studies and information available on deca-BDE, the bill was amended to remove any restriction on the use of deca-BDE
- The bill called upon the Senate Office of Research (SOR) to review the available information on deca-BDE and to recommend whether deca-BDE should be addressed in a future legislation
- The SOR report, published in May of 2004 recommended that no action be taken against deca-BDE as such action would be unsupportable
- There are no proposed bills in California that would restrict the use of deca-BDE, now or in the future



US State Activities

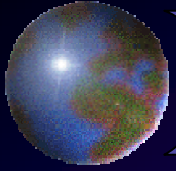
- Penta and octa-BDE (& articles containing them) have been prohibited in CA, ME, HI, MI, & MD (IL & OR awaiting signature by the governor)
- Deca-BDE is **not prohibited** or restricted in any US state or anywhere in NA
- Proposed bills addressing all PBDE's have been introduced in various US states, but no bills restricting deca-BDE have passed



North America Activities

■ Other Activity

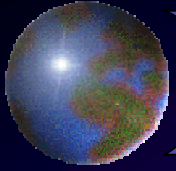
- ◆ Foam Fire Safety Act (HR 943), 2/2005: To direct the CPSC to issue standards addressing open flame ignition of consumer products containing PU foam
 - ◆ Status: Referred to the Subcommittee on Commerce, Trade and Consumer Protection
- ◆ CPSC: 5/2005, introduced a draft proposed national fire standard for home furnishings in the U.S.....possibly to be adopted as law by end of 2005



North America Activities

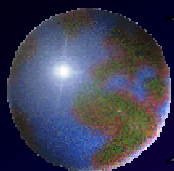
■ Other Activity

- ◆ EPA Design for Environment (DfE): evaluate penta-BDE alternative flame retardants in PU foam
- ◆ EPA Proposed SNUR on lower brominated diphenyl ether (BDE) congeners (primary aim is penta & octa-BDE)
 - ◆ Will have some impact related to the TSCA 12b reporting on export of unfinished materials (not articles) containing deca-BDE



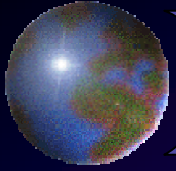
Alternatives to Deca-BDE

- **Lowell Report:** *“Decabromodiphenyether: An Investigation of Non-Halogen Substitutes in Electronic Enclosure and Textile Applications,”* April 2005 <http://www.sustainableproduction.org/proj.clea.publ.shtml>
 - Limited to summarizing the known non-halogenated substitutes to the use of deca-BDE in electronic enclosure and textile application
 - No review was performed of the literature on exposure and human and environmental impacts of the various flame retardants
 - The report does note that “thorough consideration of the health and ecosystem risks of alternatives is an important aspect of any [flame retardant] substitution process.”



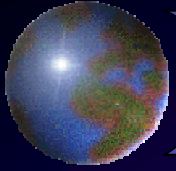
Alternatives to Deca-BDE

- ◆ With regard to the use of P-based alternatives to deca-BDE in textile applications, it states that “While these chemicals have a long history of use in the industry, there is need for more study regarding their human and environmental health effects.”
- While the report provides a fairly thorough cataloging of non-halogenated alternatives to deca-BDE, it does not provide sufficient comparison and analysis in terms of human health and environmental effects and cost to be meaningful in attempting to determine the best overall flame retardant option for a given application



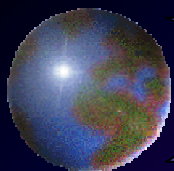
Alternatives to Deca-BDE

- **Deca-BDE is the most tested flame retardant that is available**
- The fact is that alternatives have not had anywhere near the amount of human health and environmental testing and characterization that deca-BDE has
- Some electronic equipment manufacturers have chosen to move from deca-BDE to alternative flame retardants due solely to market pressure



Additional Flame Retardant Issues of Interest for Future Discussions

- Life cycle analysis of upholstered furniture (both with and without flame retardant)
- Details of EU Risk Assessments on the other flame retardants undergoing the process
- Updates on the status of deca-BDE.....



For More Regulatory Information on Flame Retardants

www.bsef.com

Bromine Science & Environmental Forum

www.firemarshals.org

National Assoc of State Fire Marshals

www.acfse.org

European fire safety coalition

www.ebfrip.org

European brominated flame retardant industry