

Brominated Flame Retardants: Regulatory Actions and EPA Activities

NIST workshop: Fire Retardants and their Potential
Impact on Fire Fighter Health

Daniel Axelrad

U.S. Environmental Protection Agency
Office of Policy, Economics and Innovation
September 30, 2009

Outline

- Background on BFRs
- BFRs Regulatory Status
 - National, International, State
- Flammability standards
 - CPSC, California activities
- EPA's current activities on BFRs and related chemicals
 - Including combustion research

EPA Activities on Flame Retardants

- EPA attention primarily on:
 - Polybrominated diphenyl ethers (PBDEs)
 - pentaBDE, octaBDE, decaBDE
 - pentaBDE alternatives
 - Tetrabromobisphenol A (TBBPA)
 - Alternatives in printed circuit boards
 - Hexabromocyclododecane (HBCD)
 - Premanufacture review of new flame retardant chemicals
 - Not on TSCA inventory
 - Premanufacture notification to EPA required
 - PMNs under TSCA Section 5

Uses of PBDEs

- PentaBDE
 - Foam in furniture, mattresses, automobile seats
 - Prior to U.S. phaseout:
8,000 tons/year worldwide; 95% used in the U.S.
- OctaBDE
 - Plastics in electronics
 - Prior to U.S. phaseout:
4,000 tons/year worldwide; 40% used in U.S.
- DecaBDE
 - Plastics in electronics, wire/cable insulation, textiles
 - 62,000 tons/year worldwide; 44% used in U.S.

(industry data for 2001)

Concerns about PBDEs

- Toxicology findings:
 - Neurodevelopmental toxicity
 - Thyroid effects
 - Endocrine disruption
 - *Some supporting human epidemiology*
- Exposure
 - Primary pathway seems to be through house dust
 - Higher exposures for young children
 - Measured in breast milk
 - Body burdens in U.S. much higher than in other countries
- Debromination of decaBDE

Regulatory Status: pentaBDE/octaBDE

- Banned in Europe, effective August 2004
- U.S. production phased out, end of 2004
- Use banned in many states, generally effective in 2006
- No further U.S. manufacture, import or use without TSCA Premanufacture Notification (PMN)
- Added to Stockholm POPs treaty – May 2009
- *However:* many products manufactured with pentaBDE or octaBDE remain in use

Regulatory Status: decaBDE - International

- Europe: decaBDE use in manufacture of electronics banned as of July 2008
- Sweden: adopted, then reversed, a ban on decaBDE in textiles, furniture and some cables
 - Challenged by EU
- Norway: implemented a ban on decaBDE in textiles, furniture, insulation (non-transportation)
 - Also bans manufacture, import, sales of decaBDE
- Canada: bans decaBDE manufacture (2008)
 - Import, sale and use unrestricted

Regulatory Status: decaBDE - U.S.

- No federal restrictions in U.S
- Washington State
 - Determined that safer, technically feasible alternatives to decaBDE are available for use in televisions, computers and residential upholstered furniture.
 - State Fire Marshal determined that these identified alternatives meet applicable fire safety standards.
 - Restrictions on the use of decaBDE in these products will take effect on January 1, 2011.
- Maine previously adopted a similar ban on decaBDE in electronics that will take effect January 2010.
- Vermont and Oregon adopted similar restrictions in 2009

Regulatory Status: HBCD

- HBCD is primarily used in polystyrene foam insulation boards
- Determination by the European Chemicals Agency under REACH (2009):
 - HBCD is a substance of very high concern
 - Should not be used without specific authorization
 - Persistent, bioaccumulative and toxic, and used in widely dispersive uses in very high volumes

CPSC furniture flammability standard

- CPSC proposed a flammability standard for residential upholstered furniture in 2008
 - Performance standard – compliance with smolder-resistant cover fabrics or barrier materials
 - FRs would not be needed to comply, and manufacturers report they would not use FR treatments to meet the 2008 proposal
- CPSC staff is continuing research to help refine the proposed rule and provide regulatory options to the Commission :
 - full scale open flame testing at NIST – 2009
 - plans to conduct full scale smolder testing
 - Development of standard reference materials (SRMs) for use in testing

California legislation: FRs in baby products

- SB 772 would modify the CA furniture flammability standard to exempt juvenile products containing polyurethane foam - such as cribs, removable child car seats, strollers, and nursing pillows
- Passed the CA Senate, June 2009
- Did not pass CA Assembly, Sept 2009

EPA research, assessments and other activities concerning flame retardant chemicals

EPA *Design for the Environment* project on Printed Circuit Boards

- Major TBBPA use – printed circuit boards
- Goal of project: characterize environmental, health, safety, and fate aspects of FRs in printed circuit boards.
 - Apply life-cycle thinking to consider hazards and exposures.
 - Hazard reviews of the chemicals
 - Draft report available
 - Combustion testing to identify byproducts
 - Combustion testing is ongoing – completion in 2010
 - Includes open burning scenarios

<http://www.epa.gov/dfe/pubs/projects/pcb>

Research on MWCs and open burning

- EPA research has found production of brominated dioxins from combustion of PBDE-containing products in municipal waste combustors
- New study: measurement of PBDE emissions from open burning of waste (dumpsite in Mexico)
 - PBDE congener profiles suggest:
 - Br reactivity during combustion
 - open burning of domestic waste may be a significant global source
 - Formation of brominated dioxins and furans

Contact: gullett.brian@epa.gov

EPA assessment of pentaBDE substitutes

- Screening level hazard/exposure assessment of pentaBDE substitutes
 - Multi-stakeholder process, meant to inform selection of substitutes
 - Completed in 2005

www.epa.gov/opptintr/dfe/pubs/projects/flameret/index.htm

IRIS Assessments of PBDEs

- Integrated Risk Information System (IRIS) assessments of four PBDE congeners were completed in June 2008
 - *Toxicological Reviews* published
 - Reference Doses derived for:
 - BDE-47
 - BDE-99
 - BDE-153
 - BDE-209
- The IRIS program has initiated an assessment of hexabromocyclododecane (HBCD)

<http://www.epa.gov/ncea/iris/>

PBDEs Exposure Report

- EPA report to address issues regarding exposure levels, exposure pathways and environmental fate
- Draft report was released for public comment in November 2008
 - <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=198444>
- External peer review comments received and addressed
- Completion expected in 2009

decaBDE environmental fate testing

- An EPA review recommended that industry conduct specific tests of decaBDE environmental fate
 - Debromination in the environment?
- Proceeding under TSCA Section 4
 - Plans for development of an Enforceable Consent Agreement
 - Work is continuing on test protocols

<http://www.epa.gov/oppt/vccep/pubs/chem21.html>

Thank You!

- More information available at:
 - <http://www.epa.gov/oppt/pbde/>
- Contact me:
 - axelrad.daniel@epa.gov
- Acknowledgments:
 - Emma Lavoie, Clive Davies – EPA/OPPT (DfE)
 - Brian Gullett – EPA/ORD (NRMRL)