

CPSC MEETING LOG

Meeting Between: CPSC staff and Dr. Arlene Blum, Green Science Policy Institute and Dr. Vytenis Babrauskas, Fire Science & Technology, Inc.

Date: June 22, 2011

Location: CPSC Hearing Room, Bethesda Towers

Subject: Upholstered Furniture: Flame Retardant Chemicals and California Technical Bulletin 117

CPSC Attendees:

Patty Adair, ES
Commissioner Robert Adler
Michael Babich, HS
Sarah Butler, CORA
Kristina Ebersole, LS
Linda Fansler, LS
Jana Fong-Swamidoss, CORA
Rik Khanna, EXHR
David Miller, EP
Lori Saltzman, HS
Dale Ray, Project Mgr., EC
Gregory Rodgers, EC
Lisa Scott, LS
Chuck Smith, EC
Trey Thomas, EXHR
Scott Wolfson, OPA

~~CPSC 60001) CLEARED for PUBLIC~~
~~NO MFRS PRVT LABELS OR~~
~~PRODUCTS IDENTIFIED~~
~~EXEMPTED BY SECTION~~
~~60001) CLEARED for PUBLIC~~
~~NO MFRS PRVT LABELS OR~~
~~PRODUCTS IDENTIFIED~~

Non-CPSC Attendees:

Becca Brown, American Chemistry Council
Trish Callahan, Chicago Tribune
Ray Dawson, Albemarle
O.A. Ezekoye, Univ. of Texas / Austin
Barbara Little, Albemarle
Adam Maarec, McIntyre Law Firm / Polyurethane Foam Ass'n.
Mary Martha McNamara, McNamara & L'Heureux / UFAC
Michael McDonald, American Apparel & Footwear Ass'n.
Jackson Morrill, American Chemistry Council
Gordon Nelson, Florida Institute of Technology
Sean Oberle, Product Safety Letter
Lindsay Rayfield, American Chemistry Council
Lee Salamone, American Chemistry Council
Roger Salisbury, CFS
Steve Scherrer, Chemtura
Elizabeth Shogren, National Public Radio
Philip Wakelyn, Wakelyn Associates

Summary:

At this meeting, requested by Dr. Blum, she and Dr. Babrauskas presented a paper they recently completed entitled "Flame Retardants in Furniture Foam: Benefits and Risks." They expressed support for the Commission's proposed rule on upholstered furniture flammability, and generally opposed the continuing use of organo-halogen flame retardants that have long been used in polyurethane foam filling material formulations to comply with California's regulation, Technical Bulletin 117.

CPSC staff asked a number of questions about the presentation. Mr. Ray mentioned that manufacturers could meet the CPSC's proposal without using flame retardant additives in fabrics or fillings. Commissioner Adler asked about Dr. Babrauskas's experience with and views on the TB-117 open flame test method. Several of the audience attendees asked questions and made statements about the fire loss data and about the health and environmental studies cited in the presentation. Following the discussion, Drs. Blum and Babrauskas, Mr. Ray and some audience members answered questions from the three media representatives.

A copy of the slide presentation is attached to this meeting log. For further information contact Dale Ray, CPSC Project Manager, 301-504-7704; dray@cpsc.gov.



Vytenis Babrauskas

Fire Science & Technology Inc

Arlene Blum

Chemistry, University of California Berkeley

Rebecca Daley

Green Science Policy Institute

Linda Birnbaum

Director, National Institute of Environmental Health Science

Flame Retardants in Furniture Foam: Benefits and Risks



www.greensciencepolicy.org



BUREAU OF HOME
FURNISHINGS AND
THERMAL INSULATION

California Technical Bulletin 117

TB117

- Mandatory for upholstered furniture and baby products containing polyurethane foam sold in California.
- Implemented in 1975 by California Bureau of Home Furnishings and Thermal Insulation (BHFTI).
- Many products sold outside California comply.

Two questions:

Does California TB117 improve fire safety?

Is TB117 associated with adverse health or environmental impacts?



TB117 Test Methods (main tests)

1. Foams are tested for cigarette smolder resistance using a composite specimen test of foam under fabric.
2. Upholstery fabrics (by themselves, without foam) are subjected to the small-flame test of CS 191-53.
3. Bare foam without an upholstery cover is subjected to a 12 second small open flame test.



First Question:

Does California TB117 improve fire safety?



1. The smolder portion of TB117?

90% of US furniture is smolder-resistant in compliance with a voluntary furniture industry UFAC standard (CPSC, 2007)

According to John McCormack, former lab head of BHFTI:

“UFAC Smoldering Tests are actually more well thought out than the current 117 smolder tests and cover other smolder prone components such as upholstery fabrics, internal structural fabrics, smolder-resistant interliners and decorative trims.”

Conclusion:

TB117 doesn't improve the smolder resistance that already exists due to the UFAC standard.



2. Open flame part of TB117 for fabrics?

For fabrics, it is identical to the Federal test CS 191-53. All fabrics in the US already meet this standard.

Gordon Damant, former head of the BHFTI, testified in court that he never runs the fabric test since all U.S. fabrics already comply.

Conclusion:

All fabrics already meet the fabric standard (Federal test CS191-53) without TB117.



3. Open flame part of TB117 for foam?

- There would be a fire safety benefit if TB117 compliant foams :
 - prevented ignition from small-flame sources
 - or
 - reduced the severity of fires



Does meeting TB117 requirements prevent small-flame ignition?

- Once fabric burns, underlying foam is presented with much larger flame than originally ignited the fabric.
- CPSC tests of TB117 compliant chairs found that they did not resist small-flame ignitions and concluded that

*“TB117 component results were not predictive of full scale performance” and “TB117...would not, if federally mandated, ensure a substantial reduction in the risk of small open flame ignition of finished articles of furniture.”
(CPSC 1997, 2001)*



Does meeting TB117 requirements prevent small-flame ignition? cont'd

- Talley tested a series of 15 matched TB117 and non-TB117 fabric/foam composites exposed to a small-flame source and concluded:

“The TB117 foam made no significant difference in preventing ignition or reducing flame spread.”

Talley, T. H., Phases 1&2, UFAC Small Open Flame Tests and Cigarette Ignition Tests, *Annual AFMA Flammability Conf.* (1995).

- **Conclusion: TB117 foams do not prevent small-flame ignition.**



Do TB117 foams reduce the severity (heat release rate) of fires?

- Heat release rates of TB117 studied in 1982 at NIST:

Table 5
Effect of Padding Type for Specimens With Similar Fabrics

Specimen	Peak \dot{Q} (kW)	Time to Peak (s)	Padding	Fabric
F21	1970	280	California Foam	Polyolefin
F25	1990	260	Non-California Foam	Polyolefin

Babrauskas, V., et al., 1982, *Upholstered Furniture Heat Release Rates Measured with a Furniture Calorimeter* (NBSIR 82-2604), [U. S.] Natl. Bur. Stand., Gaithersburg MD

No change in heat release rate with TB117 foam.



15 times more escape time?

- A 1988 study of expensive, state-of-the art foams (much higher density; with 50% or more flame retardant content) led to an essentially non-burning outcome.

(Babrauskas, V. et al (1988). *Fire Hazard Comparison of Fire-Retarded and Non-Fire-Retarded Products* (Spec. Publ. SP 749), [U. S.] Natl. Bur. Stand., Gaithersburg MD

- Foams used to comply with TB117 have about 5% flame retardant and do not provide this result.
- Claims of TB117 giving “15 times more escape time” are made based on a study where the density of the foam was three or more times greater than the density of typical TB117 foam!



Fire Safety Conclusion

- Compliance with the California TB117 standard does not enhance the fire safety of furniture or baby products containing foam.



Second Question:

Is California TB117 associated with adverse health or environmental impacts?



THE PROBLEM:

Most Chemicals Are NOT Effectively Regulated in the U.S.

- The U.S. Toxic Substances Control Act (1976)
- 62,000 chemicals in commerce “grandfathered”
(PCBs, Haloalkanes, Dioxin, Hexavalent Chromium, Asbestos)
- 20,000 new chemicals have been introduced
 - 85% have no health data
 - 67% have no data at all





- 21 chemicals banned by the Stockholm Convention on Persistent Organic Pollutants (POPs)
- All are organohalogenes

Cellular defense systems do not recognize organohalogenes

They passively diffuse across cell membranes into cells.



Cellular bouncers



Cellular detoxification

Organohalogen Pesticides and Flame Retardants

(Carbon bound to Bromine, Chlorine, Iodine)

- Pesticides
 - mostly banned at PBTs
 - DDT, Mirex, Dieldrin, Aldrin, etc
 - found in very low and decreasing levels in food
- Flame Retardants
 - still in common use
 - similar or identical to pesticides
 - in furniture, insulation, up to pound levels
 - found in very low and increasing levels in food

PROTECT YOUR CHILDREN Against Disease-Carrying Insects!



TRIMZ DDT
REG. U. S. PAT. OFF.
**CHILDREN'S ROOM
WALLPAPER** and Ceiling
Paper

KILLS FLIES, MOSQUITOS, ANTS

... as well as moths, bedbugs, silverfish and other household pests after contact!

MEDICAL SCIENCE KNOWS many common insects breed in filth, live in filth and carry disease. Science also recognizes the dangers that are present when these disease-carrying insects invade the home. Actual tests have proved that one fly can carry as many as 6,600,000 bacteria! Imagine the health hazard—especially to children—from flies seriously suspected of transmitting such diseases as scarlet fever, measles, typhoid, diarrhea . . . even dread polio! Some types of mosquitos carry malaria and yellow fever. And any mosquito bite is painful and easily infected when scratched.

NON-HAZARDOUS to children or adults, to pets or clothes. Certified to be absolutely safe for home use. Tested and commended by *Parents' Magazine*.

GUARANTEED effective against disease-carrying insects for 1 year. Actual tests have proven the insect-killing properties still effective after 2 years of use.

NO SPRAYS! NO LIQUIDS! NO POWDERS! So convenient, so safe because the DDT is fixed to the paper. It can't rub off!

BEAUTIFUL! "Jack and Jill" or "Disney Favorites"—gay new patterns that protect as they beautify a child's room.

DDT CEILING PAPERS, TOO! Extra protection for your children's room—for every other room in the house. Choice

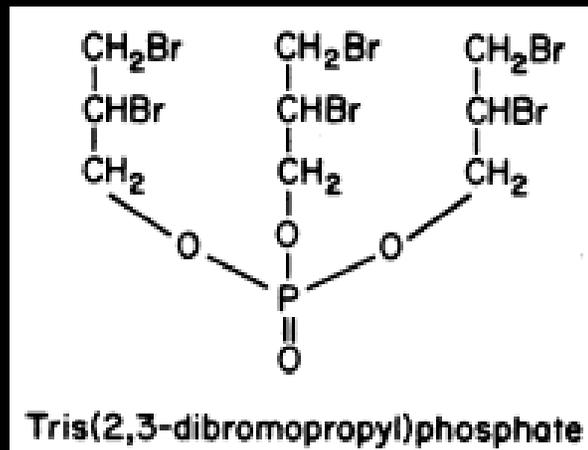
TESTED AND
COMMENDED
by
**PARENTS'
MAGAZINE**
CONSUMER
SERVICE



Brominated Tris Flame Retardant

Tris (2,3-dibromopropyl) phosphate

- In U.S. children's sleepwear 1975 to 1977
- Up to 10% of the weight of fabric
- Not covalently bonded to fabric
- Metabolite found in children's urine
- Mutagen and possible carcinogen



Science, January 7, 1977

Flame-Retardant Additives as Possible Cancer Hazards

The main flame retardant in children's pajamas is a
mutagen and should not be used.

Arlene Blum and Bruce N. Ames



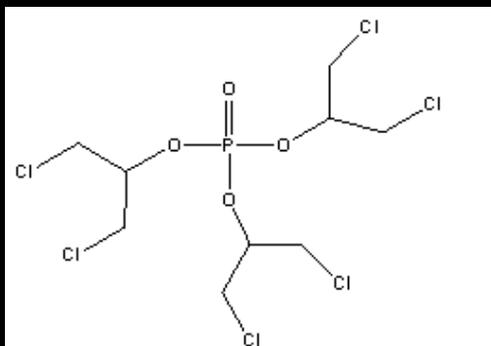


U.S. Consumer Product
Safety Commission

CPSC Bans TRIS-Treated Children's Garments

April 7, 1977

Chlorinated Tris (TDCPP) replaced Brominated Tris

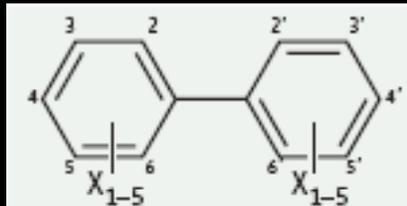


Tris (1,3-dichloro-2-propyl) phosphate

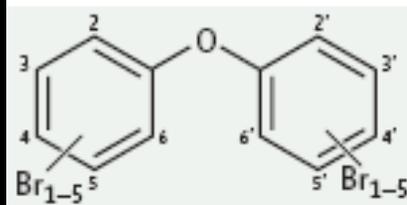
- Voluntarily removed from children's PJ's in 1977
- used today in baby products, furniture to meet TB117



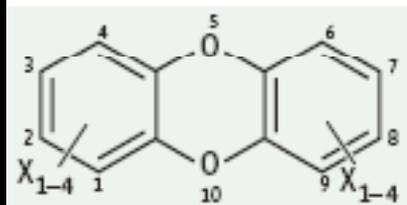
PentaBDE used to meet TB117



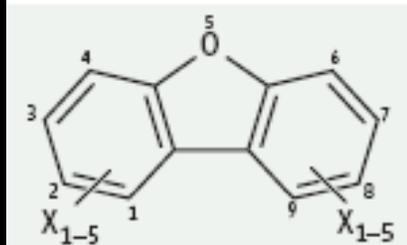
PCBs (X = Cl) and PBBs (X = Br)



PBDEs



Dioxins (X = Cl or Br)



Furans (X = Cl or Br)

97.5% of global use in North America (1999).

Main Replacements:
TDCPP or chlorinated Tris
FM550

Hale RC, et al, Polybrominated diphenyl ether flame retardants in the North American environment. *Environ Int* 2003;29:771-9.

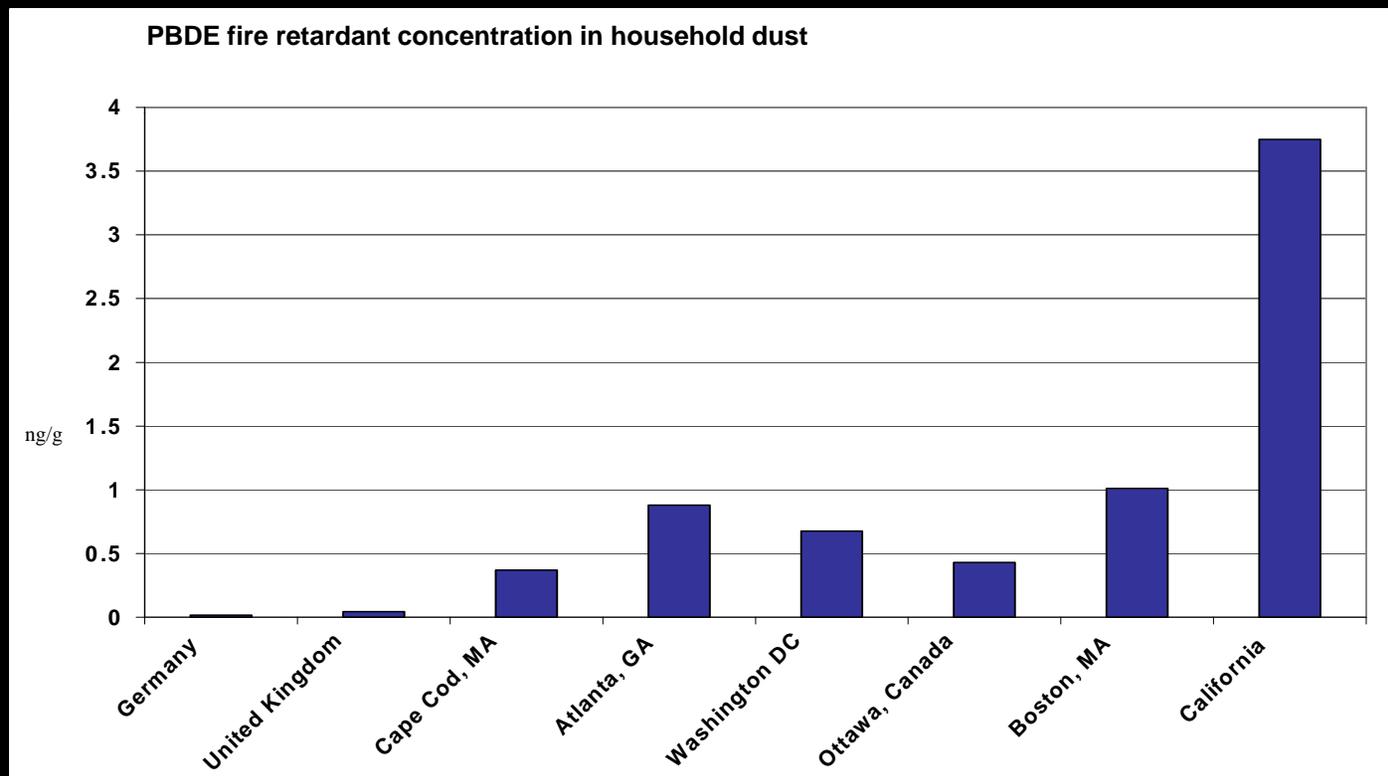
Human Exposure

- Flame retardants migrate into house dust

- Stapleton, H. M., J. G. Allen, S. M. Kelly, A. Konstantinov, S. Klosterhaus, D. Watkins, M. D. McClean, and T. F. Webster. 2008. Alternate and new brominated flame retardants detected in U.S. house dust. *Environ Sci Technol* 42 (18): 6910-6.

- Californians have higher levels in their house dust and body fluids than residents of other states

- Kellyn S. Betts, *Environmental Health Perspectives* 116, A202 - 208, 2008



Source: Elevated House Dust and Serum Concentrations of PBDEs in California: Unintended Consequences of Furniture Flammability Standards? Zota, Ami R., Rudel, Ruthann A., Morello-Frosch, Rachel A., and Brody, Julia Green, *Environ. Sci. Technol.*, 2008, 10.1021/es801792z

GREEN SCIENCE POLICY INSTITUTE
greensciencepolicy.org

ANIMAL HEALTH EFFECTS

- Chronic toxicity: long term impacts
 - Endocrine disruption
 - Neurodevelopment: Decreased memory, learning deficits, altered motor behavior, hyperactivity
 - Reproductive system effects: Abnormal gonadal development, reduced ovarian follicles, reduced sperm count
 - Immune suppression
 - Interference with thyroid hormone action
 - Cancer



PentaBDE and Human Health

- **Cryptorchidism**
- **Reproductive Hormone Effects**
 - Decrease in Androgens and LH;
 - Increase in FSH and Inhibin
 - Decrease in Testosterone
- **Reproductive Effects**
 - Low Birth Weight;
 - Altered Behaviors
 - Increased time to pregnancy**
- **Neurological Effects**
 - Decreased IQ**
- **Decreased Sperm Quality**
- **Diabetes**
 - Lim et al, 2008
 - Turyk et al, 2009 (only in hypothyroid subjects)
- **Thyroid Homeostasis**
 - elevated T4
 - elevated T4, TBG
 - Elevated T3
 - Low TSH
 - Low TSH during pregnancy



Courtesy, Linda S. Birnbaum, Director, NIEHS and NTP

Mothers' Milk

Record levels of toxic
fire retardants found in
American mothers' breast milk

www.ewg.org





© Rita C

Halogenated Flame Retardants

Head support



Sleep Positioner



Car Seat



Carrier



Stroller



Changing Pad



Nursing Pillow





95 ppm pentaBDE in dust





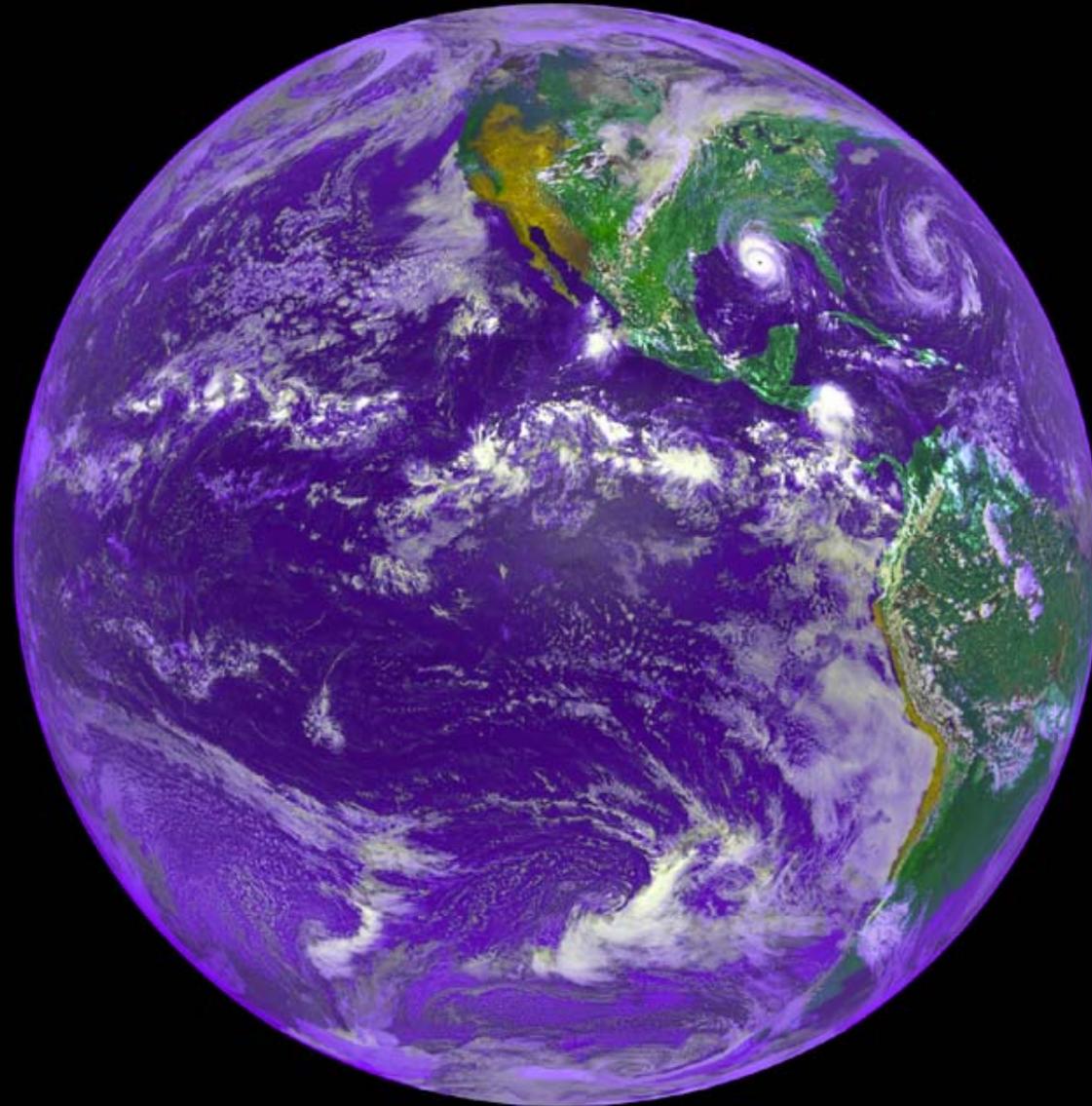
95 ppm and 3 ppm two years later

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National Oceanic & Atmospheric Administration (NOAA) Finds Penta in Sediments & Bivalves



Atmospheric transport to polar regions



Brominated flame retardants are global contaminants



Brominated Flame Retardants in the Arctic
Arctic Monitoring and Assessment Programme (AMAP) and Arctic Council Action Plan to Eliminate Pollution of the Arctic (ACAP): Jan 2005



Chlorinated, brominated, and perfluorinated compounds, polycyclic aromatic hydrocarbons and trace elements in livers of sea otters. Kurunthachalam, K, et al. J Environ Monit. 2008 Apr;10(4):552-8.



Bioaccumulation and biotransformation of 61 polychlorinated biphenyl and four polybrominated diphenyl ether congeners in juvenile American kestrels. Drouillard KG, et al. Environ Toxicol Chem. 2007 Feb;26(2):313-24.



Fireproof killer whales (*Orcinus orca*):
Peter S. Ross. Can. J. Fish. Aquat. Sci. 63: 224-234 (2006)



Persistent pollutants in nine species of deep-sea cephalopods. Unger, M.A. et al., Mar. Pollut. Bull. (2008), doi:10.1016/j.marpolbul.2008.04.018



Brominated Fire retardants found in Tasmanian devils. The Australian, January 22, 2008

In the Columbia River

- Flame retardants are present in the food chain, including invertebrate prey of juvenile salmon
- They are bioaccumulating in endangered juvenile salmon
- In the Upper Columbia, Snake River, Lower Columbia and Willamette River, stocks are being exposed

Courtesy, NOAA Fisheries, Northwest Fisheries Science Center, Seattle, WA

Toxic Effects in fish at levels in the Columbia

- Thyroid hormone alteration in juvenile lake trout (Tomy et al. 2004),
- Thyroid hormone alterations in adult flounder (Kuiper et al. 2008).
- Evidence of oxidative stress and increased melanomacrophage density in wild barbels (Raldua et al. 2008).
- Evidence of reduced disease resistance in juvenile Chinook (Arkoosh et al. 2010).

Second Question:

Is California TB117 associated with adverse health or environmental impacts?



EDITORIAL



San Antonio Statement on Brominated and Chlorinated Flame Retardants

Article

Joseph DiGangi¹, Arlene Blum^{2,3}, Åke Bergman⁴, Cynthia A. de Wit⁵, Donald Lucas⁶, David Mortimer⁷, Arnold Schechter⁸, Martin Scheringer⁹, Susan D. Shaw¹⁰, Thomas F. Webster¹¹

1 International POPs Elimination Network, Berkeley, California, USA, **2** Department of Chemistry, University of California, Berkeley, California, USA, **3** Green Science Policy Institute, Berkeley, California, USA, **4** Department of Materials and Environmental Chemistry, and, **5** Department of Applied Environmental Science, Stockholm University, Stockholm, Sweden, **6** Lawrence Berkeley National Laboratory, Berkeley, California, USA, **7** Food Standards Agency, London, United Kingdom, **8** University of Texas School of Public Health, Dallas, Texas, USA, **9** Institute for Chemical and Bioengineering, ETH Zürich, Zürich, Switzerland, **10** Marine Environmental Research Institute, Center for Marine Studies, Blue Hill, Maine, USA, **11** Department of Environmental Health, Boston University School of Public Health, Boston, Massachusetts, USA

Jump to

[Signatories](#)[Supplemental Material](#)

Firefighters



- Firefighters have significantly elevated rates of multiple myeloma, non-Hodgkin's lymphoma, prostate, and testicular cancer.*
- These types of cancer are associated with dioxin/furan exposure.
- Halogenated flame retardants yield high levels of dioxins and furans upon combustion

*G.K. LeMasters, et al, Journal of Occupational and Environmental Medicine 48(11): 1189-202(2006).

SB147 Consumer Choice Fire Safety Act



An alternative furniture flammability standard that would maintain or increase fire safety without flame retardants.



Every Second Counts When Escaping A Fire

Presorted Standard
U.S. Postage
PAID
Rancho Cordova, CA
Permit #275

PAID FOR BY CALIFORNIANS FOR FIRE SAFETY

Paid for by “Californians for Fire Safety”

- Albemarle
- Chemtura
- IC-Ltd Industrial Products (Dead Sea Bromine)

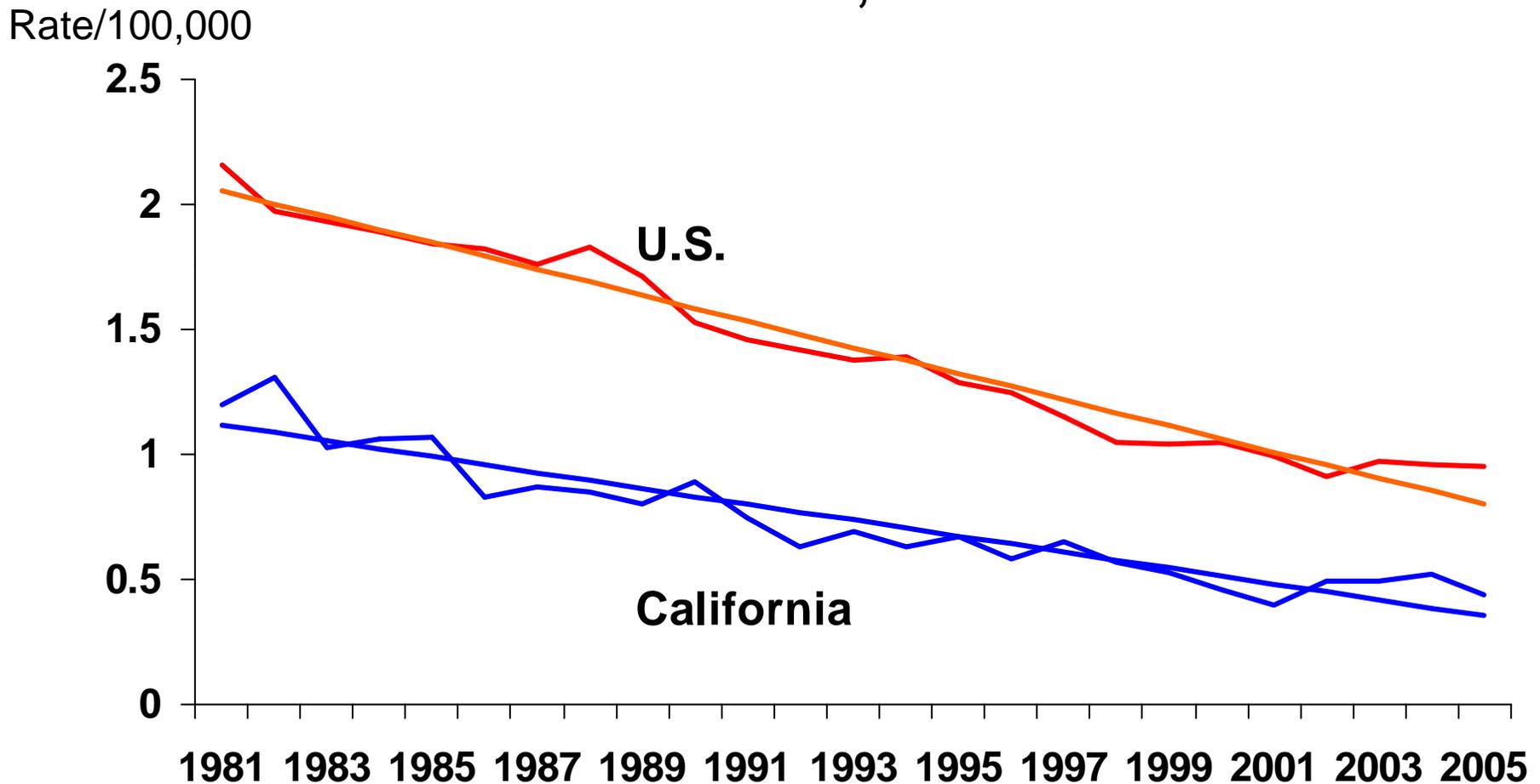
Why?

Albermarle's profits up 377% from an increase
in BFR sales. Chemical and Engineering News February 1, 2010

Chemtura Corporation will increase prices in all
regions on bromine-based products by up to
25 percent ...to secureproduct
stewardship and continued advocacy efforts Mar
29, 2010 (BUSINESS WIRE)



Residential Fire and Flame Death Rates in U.S. and California, trend data with linear estimation line, 1981-2005



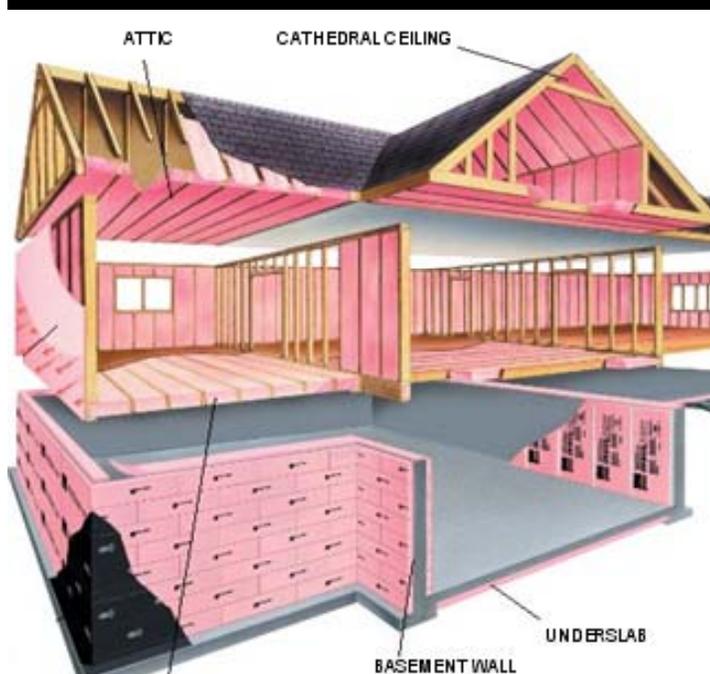
Source: WISQARS, Centers for Disease Control and Prevention

Prepared by: California Department of Public Health, EPIC Branch

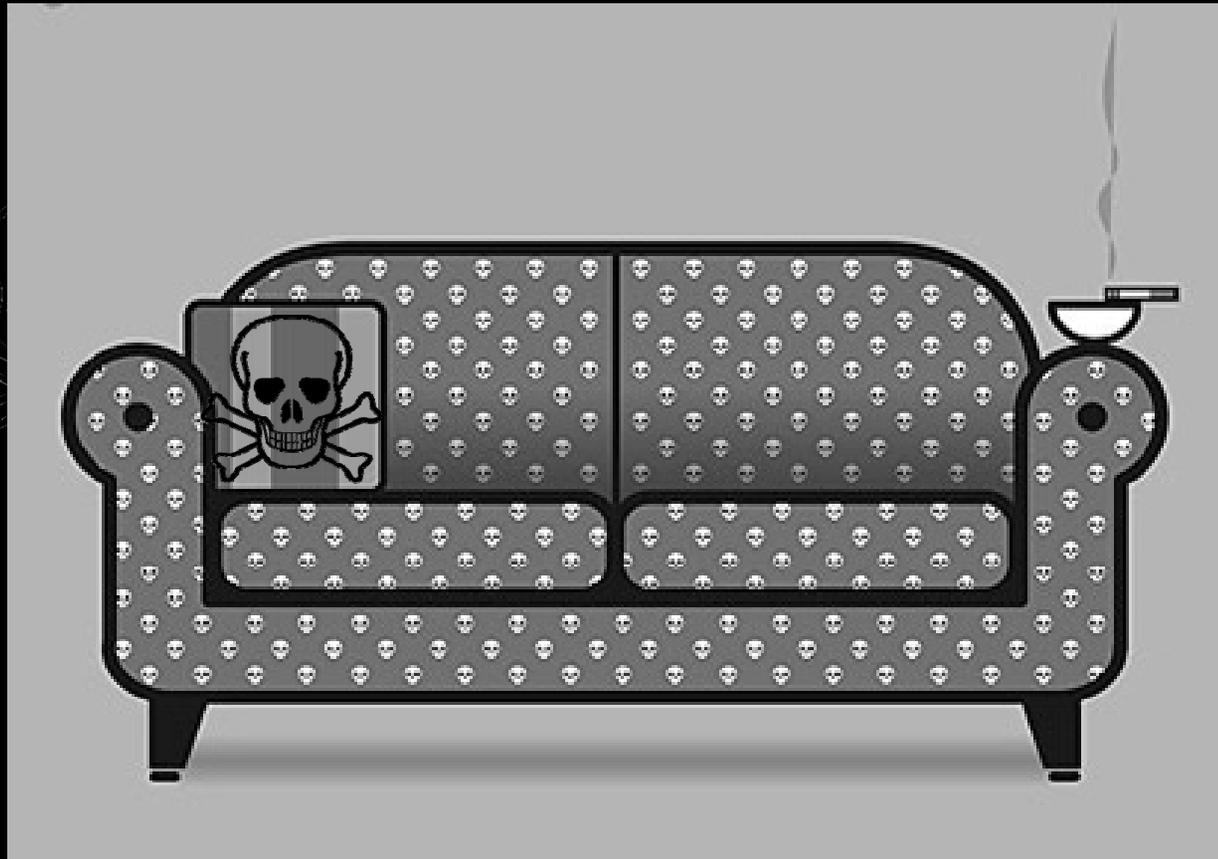
More Research and Collaboration is needed



- Our example here shows there are *not* fire safety benefits to TB117 foams.
- In other applications, both the fire safety benefits and the potential for environmental and health harm should be considered.
- Greater collaboration between the fire science and health communities is needed.



Email foamstudy@GMail.com to join the study



PIXE or **P**article **I**nduced **X**-ray **E**mission



For e-newsletters on science
& policy of flame retardants,
please leave your card.



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The flame retardant problem is solvable

**With shared research & information,
we can have a safer & healthier world.**



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