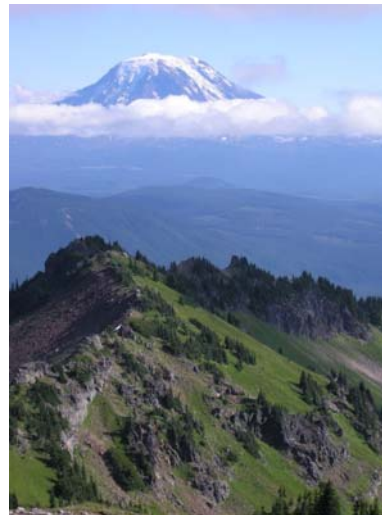




Mountains and Molecules















DENALI
DAMSELS
1970





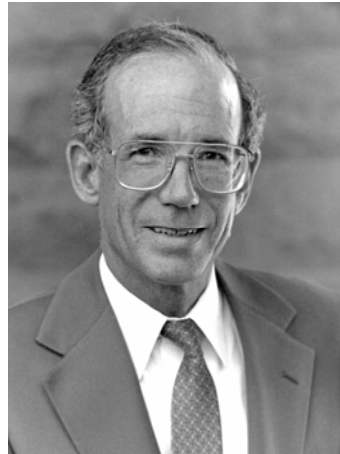




1975: Our planet is being cut apart by two blades of a scissors:

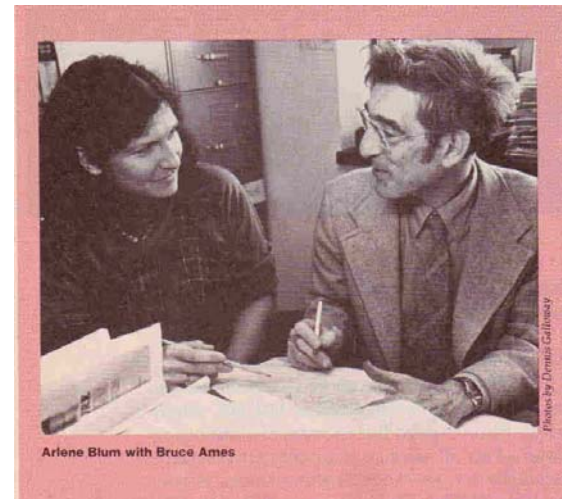
1. Over population in the developing world
2. Over use of resources and toxic pollution in the developed world

Carl Djerassi



Don Kennedy

Bruce Ames



Brominated Tris Flame Retardant

Tris (2,3-dibromopropyl) phosphate



- Used to treat children's sleepwear from 1975 to 1977 in the US
- Up to 10% of the weight of fabric
- Padded on to fabric, not attached
- Absorbed in children's bodies; metabolite found in their urine
- Metabolite is 2,3-dibromopropanol
- Impurity is 0.05% DBCP or (1,2-dibromo-3-chloropropane)
- 2,3-dibromopropanol and DBCP known carcinogens since 1973.









THE
MUTANTS



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

Thousands of chemicals to which humans have been exposed have been introduced into the environment without adequate toxicological testing.

Some chemical flame retardants provide a good example of a technological innovation where adverse environmental effects may outweigh some of the benefits.

Until recently, little attention was paid to the long-term biological effects of these flame-retardant compounds. The main organic chemicals used in flame retardants contain bromine or chlorine or they are phosphate esters. Some have chemical structures (discussed below) that are closely related to compounds known to cause cancer or to be toxic to animals. Several compounds previously used as flame retardants have been shown to be teratogenic, carcinogenic, mutagenic, or highly toxic (4).



**U.S. Consumer Product
Safety Commission**

CPSC Bans TRIS-Treated Children's Garments

FOR IMMEDIATE RELEASE

April 7, 1977

Release # 77-030

Brominated Tris replaced by Chlorinated Tris



Sleepwear in stores, six months after the 1977 Tris ban:

18% has tris (1,3-dichloro-2-propyl) phosphate

34% has tris (2,3-dibromopropyl) phosphate

















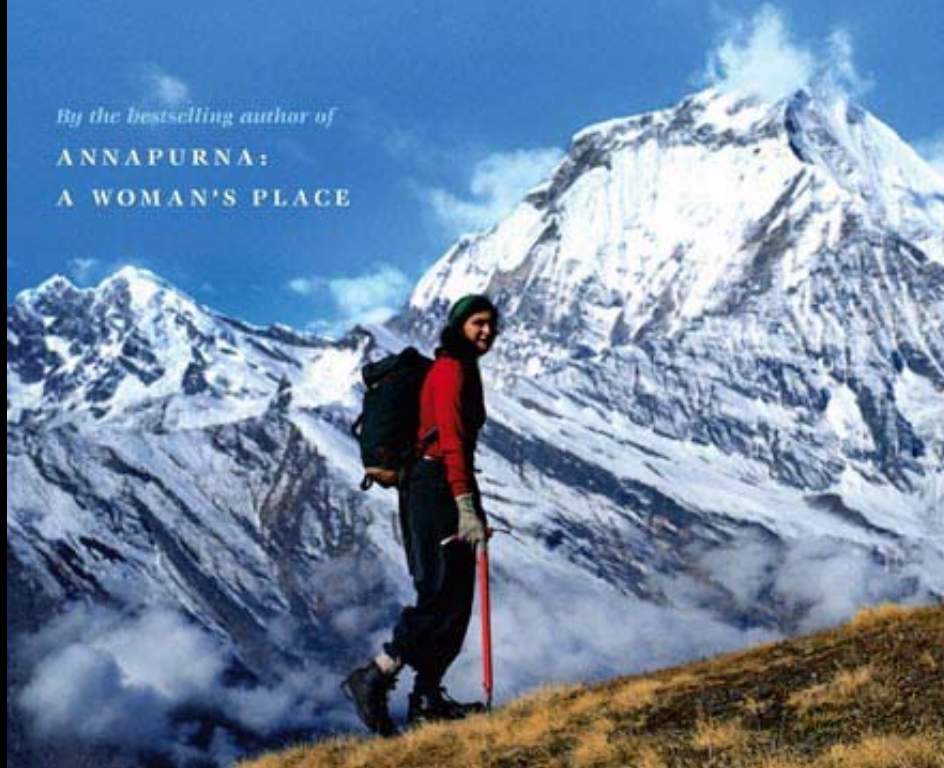


Arlene Blum

BREAKING TRAIL

A Climbing Life

By the bestselling author of
**ANNAPURNA:
A WOMAN'S PLACE**





Since the 1980s:

**Technical Bulletin 117 (TB117)
California Open Flame Furniture Standard**

- Polyurethane foam in furniture must withstand a 12-second exposure to an open flame. No flammability requirement enforced for fabric.
- Only California has a furniture flammability standard.
- Only PentaBDE was added to furniture foam from 1980 to 2004. Used in amounts up to 10%.

PentaBDE used to meet TB117

- 20 million pounds annual usage
- 98% used in the USA and Canada
- Used primarily to comply with the California furniture standard TB117

Halogenated Flame Retardants Are Ubiquitous and Believed to Impact Health of Wild Animals



Cellular Defense Mechanisms Don't Recognize BFRs and CFRs



Cellular bouncers



Cellular detoxification

Health Impacts of PentaBDE

➤ Reproductive Effects

- PentaBDE exposure causes abnormal gonadal development in rats. The number of ovarian follicles are reduced in female rat and sperm count decreased in males
- Exposure delays the onset of puberty in male and female rats

➤ Neurobehavioral Impacts

- Exposure to PBDEs during brain development results in neurological deficits including decreased memory, learning deficits, and altered motor behavior
- PentaBDE exposure in utero is associated with hyperactivity

➤ Interference with Thyroid Hormone Action

- PBDEs bind to thyroid hormone receptors
- PBDE exposures have been correlated with decreased thyroid hormone levels (serum T4) in mice, rats, kestrals, and frogs

August 9, 2003

California Bans Penta and Octa-BDE

November 3, 2003

**Great Lakes Chemical Co.
agrees to voluntarily cease
Penta-PBDE production.**

Replacement: Firemaster 550

PentaBDE replacements: Firemaster 550

EPA Design for the Environment predicted reproductive, neurological, & developmental toxicity as well as persistent degradation products.

In 2005, Chemtura agreed to doing a reproductive, developmental toxicity, migration study by Jan 2009.

Chemtura has provided no data to date

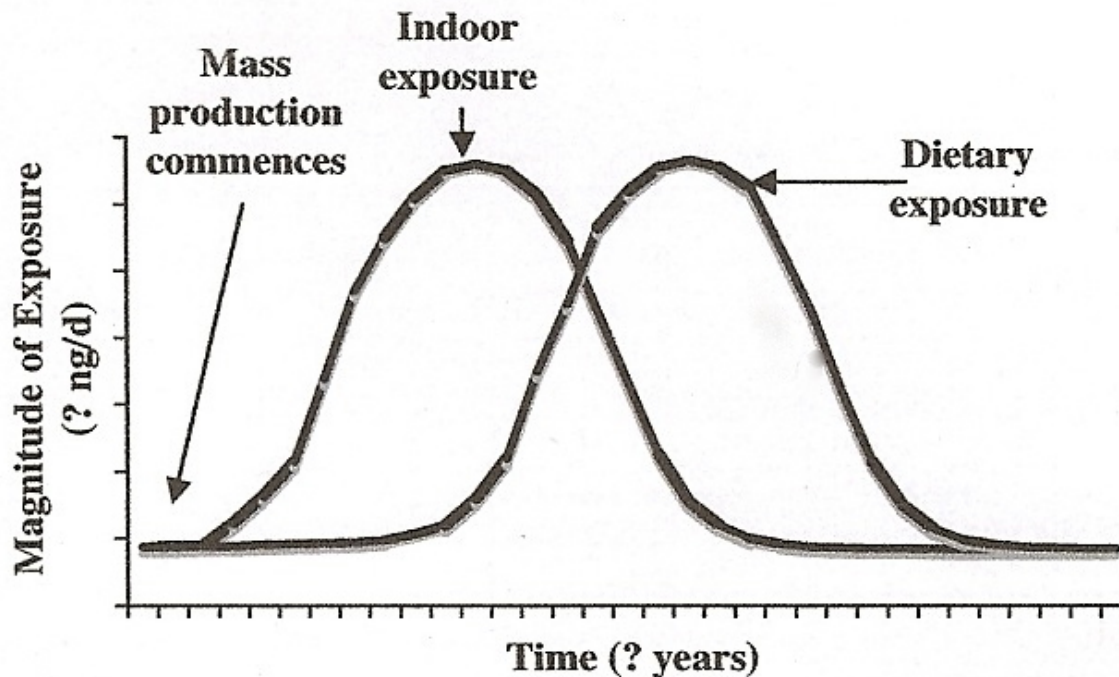
Firemaster 550 is found in dust and sewage sludge

1. Triphenyl Phosphate (highly eco-toxic)
2. Triaryl phosphate isopropylated (probable reproductive toxin)
3. Bis(2-ethylhexyl) tetrabromophthalate
4. 2-ethyl hexyl 2,3, 4, 5-tetrabromobenzoate

Firemaster 600 will replace 550 in December, 2008

The PBDE “Time Bomb”

- PentaBDE in furniture is slowly “bleeding” into the outdoor environment.
- Due to atmospheric transport and persistence, it will be magnified in food chains.
- Our main exposure route will shift from indoor air and dust to diet.



E-waste tsunami of decaBDE

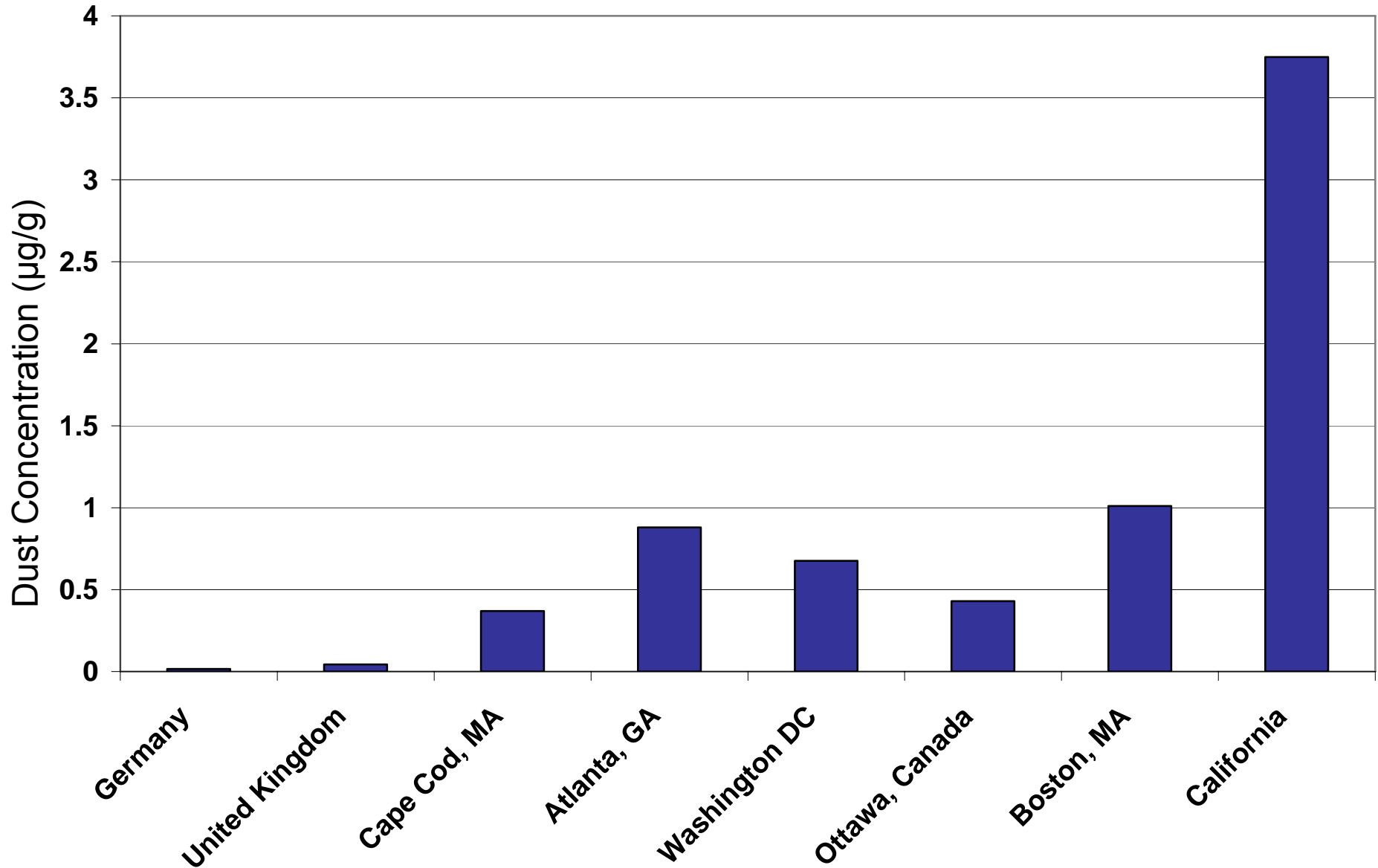
- Millions of TVs will become obsolete in February with switch from analog to digital.
- E-waste tsunami of plastic treated with decaBDE heading into landfills
- The Electronics TakeBack Coalition is encouraging TV manufacturers to responsibly recycle their products.
- Sony is the only manufacturer with a TV Take-Back program in the U.S.





My Cat Midnight has thyroid disease & a high PBDE body burden

BDE-99 fire retardant concentration in household dust



From: Zota et al., 2007 ISEA annual meeting.

Silent Spring Institute



**SCIENCE, 12 OCTOBER
2007, VOL 318, p. 194**

**Biophysical chemist Arlene
Blum, using an x-ray
fluorescence analyzer,
measures 5% bromine from
the fire retardant in her couch
foam.**

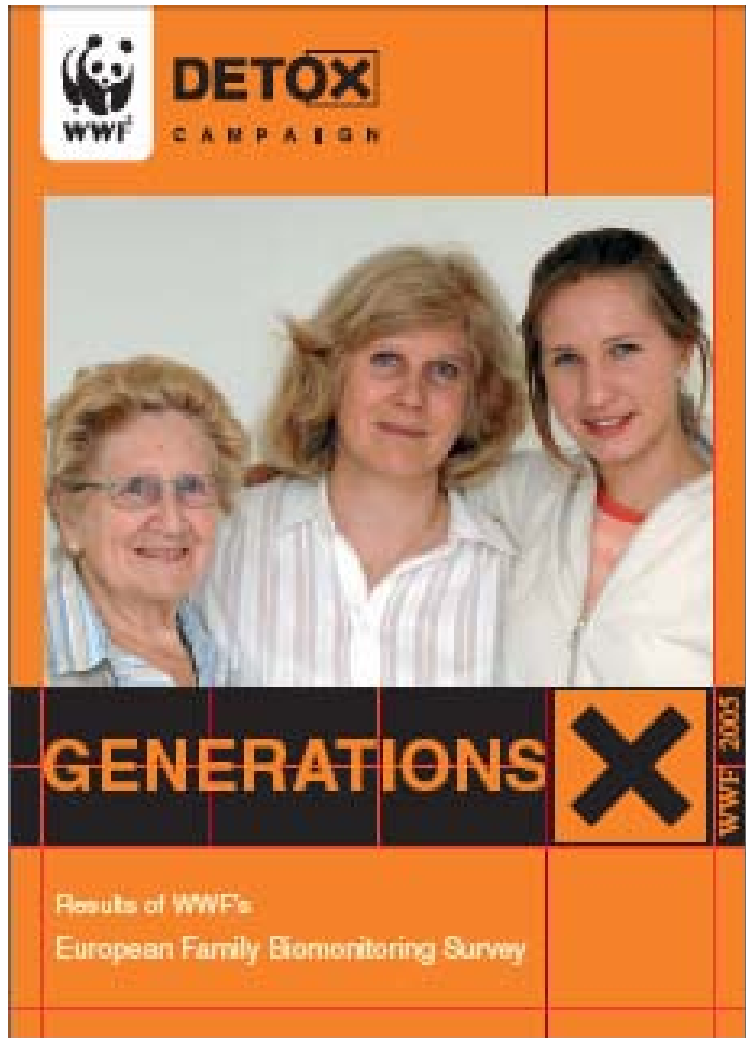
What is my daughter's PBDE level?





Where should all the PBDE furniture go?

WWF Body Burden Study of Three Generations



- Professor Jacqueline McGlade, Executive Director of the European Environmental Agency (EEA), and her daughters had highest PBDE levels.
- Lived in the U.S. and Canada for eleven years

AB 706: The Crystal Golden-Jefferson California Furniture Safety and Fire Prevention Act



Based on Blum's Op-ed



Introducing bill with Mary Brune (MOMS), Russell Long (FOE), Mark Leno, and Andrew McGuire



Industry \$10 million media blitz

Example of Next Generation Chemical Policy:

- Bans all BFRs and CFRs from furniture and bedding unless manufacturer can show safety
- Alternatives have to be safe for health, environment
- Transfer responsibility to chemical producer
- LA Times selected it as “One of six must pass bills of 2007”
- Passed Assembly, Senate Committees, Vote in 2008



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

Californians for Fire Safety

- Albemarle, Chemtura, IC-Ltd Industrial Products (Dead Sea Bromine)
- Suppliers of fire retardant chemicals



California TB604 Bed Clothing Standard

Filled bed clothing such as comforters, mattress pads and pillows must withstand open flame ignition

- No consideration of health or environmental impact
- No labeling for consumers
- Expected in 2008



- Office chair in California
- Dec 2007
- 8,000 ppm Br



Successes





U.S. Consumer Product Safety Commission

New Standard For Furniture Flammability

December 2007

Based on health and environmental concerns, the Consumer Product Safety Commission (CPSC) has proposed a national flammability standard that can be met without fire retardant chemicals in foam.

“No one wants to trade fire risks for chemical toxicity risks.”

CPSC Commissioner Thomas Moore



Commission Electrotechnique Internationale
International Electrotechnical Commission

International IEC Electronics Standard 62368

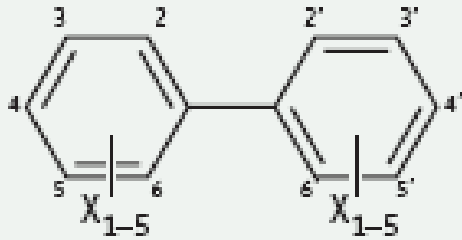
Section 7 could lead to up to an estimated additional 1.7 billion pounds of fire retardant chemicals annually to protect the housings of electronics against candle fires.

There are no fire deaths in from candle fires in consumer electronics in the U.S.

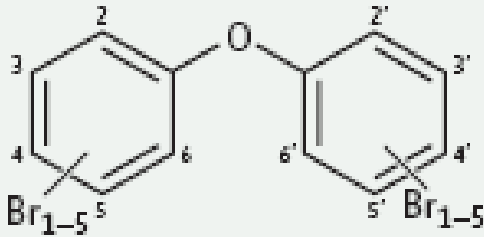
Motivation from the fire retardant chemical industry

Plastic treated with FRs is burned rather than recycled

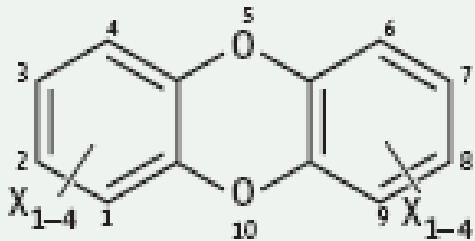




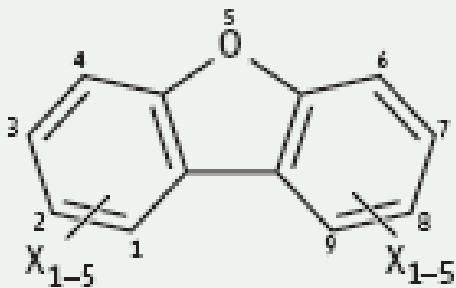
PCBs (X = Cl) and PBBs (X = Br)



PBDEs



Dioxins (X = Cl or Br)



Furans (X = Cl or Br)

BFRs and
CFRs combust
to form dioxins
and furans

What Can Be Done To Influence this Flammability Standard?

The process is far enough along and sufficiently isolated to preclude the NGO community from influencing the standard.

Pure Strategies in November 2007

IEC 62321 is being voted on right now. You can see it in April after it passes.

Underwriters Laboratory in December 2007



Case against Candle Resistant Electronics

(Updates at <http://greensciencepolicy.org/standards.shtml>)

Firefighters oppose BRFS and CFRs in electronic housings



- Fire fighters have significantly elevated rates of multiple myeloma, non-Hodgkin's lymphoma, prostate, and testicular cancer.
- These four types of cancer can all be related to exposure to dioxins and/or furans
- Dioxins and furans are produced at high levels when BRFS and CFRs burn

The Fire Retardant Dilemma:

Balancing Fire Safety, Health & Environment



Tri annual seminar series to brings together a community from government, industry, academics, NGOs. and community to learn about toxic chemical issues and strategize technical and policy solutions.

Session VI September 19, 2008 at UC Berkeley
http://greensciencepolicy.org/conferences/09_20_07.shtml

Reducing Ignition Sources is More Effective than Fire Retarding the Fuel



22 states require fire-safe or reduced ignition propensity, (RIP) cigarettes beginning with NY in 2004.



CPSC & candle industry fire safety standards addressing four root causes of candle fires introduced in 2004.

Four candle standards defeated by scientific information

- 58% of 27 voting countries voted against the IEC 62368 candle standard.
- Underwriter's Laboratory candle standard defeated May 19
- Canadian Standards Association standard defeated May 19
- IEC 60065 for TV housings defeated with 31% voting No on June 27

A victory for sustainability, human health,
and the global environment.

Initiative for Green Science Policy (GSP) at the UCs and Stanford



- Provide unbiased data and research results to help industry move toward sustainability.
- Serve as an interface between academic scientists and policy opportunities.
- Provide student interdisciplinary research projects to address with real world policy, health, and environmental applications.
- Interface and support REACH and other environmental initiatives in the EU and world wide.



WITH THANKS TO

The AB706 Team

Russell Long, Friends of the Earth

Mary Brune, MOMS(Making Our Milk Safe)

Sara Schedler, Friends of the Earth

Assemblyman Mark Leno

Bart Broome

Andrew McGuire, Trauma Foundation,

Joan Blades, Moms Rising, MoveOn.org



The IEC Standard Team

Michael Kirschner, Design Chain Associates

Sara Schedler, Friends of the Earth

Judy Levin, Center for Environmental Health

Ralf Lottes, Secretary General, ECOS

Jerker Ligthart, Intl Chemical Secretariat

Ian Clark, European Commission, DG Environment

Peter Brigham, American Burn Association

A photograph of a snowy mountain landscape. In the foreground, a wide, snow-covered ridge stretches across the frame. Several people, likely hikers or mountaineers, are visible on the ridge, carrying large backpacks. The background shows steep, snow-covered mountain slopes under a clear blue sky. The overall scene is bright and high-contrast due to the snow and the clear sky.

Supporters and Volunteers

Hillary and Danny Goldstine

Raphael Shannon

Julie Billings

Sarah Hanson

B.K. Moran

Steven Gardiner, Albany Animal Hospital

Heidi Botts

Barb and Ed Strauss

Heddy Riss

Ann Stein

Rick Saltzman

Apryle Craig-Magistro,

Larry and Catherine Shaw

Some Scientific Advisors

Robert G. Bergman Ph.D, Gerald E. K. Branch Distinguished Professor, Department of Chemistry, University of California, Berkeley

Peter Brigham, Board member, Federation of Burn Foundations

Ronald C. Cohen, Ph.D, Professor and Vice Chair, Department of Chemistry, University of California, Berkeley

Terry Collins, Ph.D, Thomas Lord Professor of Chemistry, Carnegie Mellon University, and Director, Institute of Green Oxidation Chemistry

Devra L. Davis, PhD, MPH, Director, Center for Environmental Oncology, University of Pittsburgh Cancer Institute;

David Epel, Ph.D, Jane and Marshall Steel Jr. Professor, Biological Sciences, Stanford University

Bruce D. Hammock, Ph.D, Distinguished Professor of Entomology & Cancer Research Center, Director, NIEHS-UCD Superfund Basic Research Program, UC Davis

Robert H. Rice, Ph.D, Professor, Department of Environmental Toxicology University of California, Davis

An aerial photograph of a mountain range covered in snow, with a river valley cutting through the center. The text is overlaid on the left side of the image.

36ZeroWaste Group, Inc. (Canada)
AAMMA - Asociacion Argentina de Medicos por el Medio Ambeinte (Argentina)
AKUT - Information and Advice Centre for Pollutant Loads (Luxembourg)
APROMAC - Environment Protection Association (Brazil)
ARTAC - Association for Research on Treatments Against Cancer (France)
BANANAS Child Care & Family Support Agency
Basel Action Network
Breast Cancer Action
Breast Cancer Fund
Canadian Environmental Law Association
CATs - Communities Against Toxics (Scotland)
Center for Environmental Health
Center for International Environmental Law
Center for Environmental Oncology of the U Pittsburgh Cancer Institute
CIEL - Center for International Environmental Law
Clean New York
Clean Production Action
The Coalition for a Healthy Calgary (Canada)
Coalition for a World Parliament and Global Democracy
Commonweal
Consumer Federation of California
Department of the Environment, City of San Francisco
DE-Toxics Institute
Dutch Platform Health and Environment (Netherlands)
Earth Forever Foundation (Bulgaria)
East Cork for a Safe Environment (Ireland)
Ecobaby Foundation (Europe)
Electronics Take Back Coalition
Environmental Defense Fund
Environmental Health Fund
European Academy for Environmental Medicine (Germany)
European Environmental Bureau



European Environmental Citizens' Organization for Standardization
Friends of the Earth
Health Care Without Harm Europe
Europe Health and Environment Alliance
Healthy Building Networks
Hospital Fire Marshals' Association, Inc.
Initiative for Green Science Policy
Initiative Liewensufank, Pregnancy, Childbirth Parenting Centre (Luxembourg)
Institute for Zero Waste in Africa (South Africa)
Institute of Green Oxidation Chemistry, Carnegie Mellon University
Inter-Environnement Wallonie (Belgium)
International Chemical Secretariat (Europe)
ISDE - International Society Doctors for the Environment (Austria)
ISTAS (Spanish Union Institute of Work, Environment and Health)
JA! Justica Ambiental (Mozambique)
The Lands Council (Canada)
MGM, Foundation Reporting Health and Environment (The Netherlands)
MOMS(Making Our Milk Safe)
Moms Rising
Mother Earth Foundation (Philippines)
National Toxics Network Inc. (Australia)
Natural Resources Defense Council
Oregon Toxics Alliance
Pacific Environment-China
Parents for a Safer Environment
Planning and Conservation League
Public Trust Alliance
Pure Strategies
Quercus (Portugal)
SEPTA - Centre for Sustainable Alternatives (Slovakia)
Sierra Club
Rainforest Action Network
Silicon Valley Toxics Coalition
SNF – Society for Sustainable Living (Czech Republic)
SSNC – Swedish Society for Nature Conservation (Sweden)
Sustainable Health Institute
WECE - Women in Europe for a Common Future (Netherlands Germany)



Would you like to learn more?

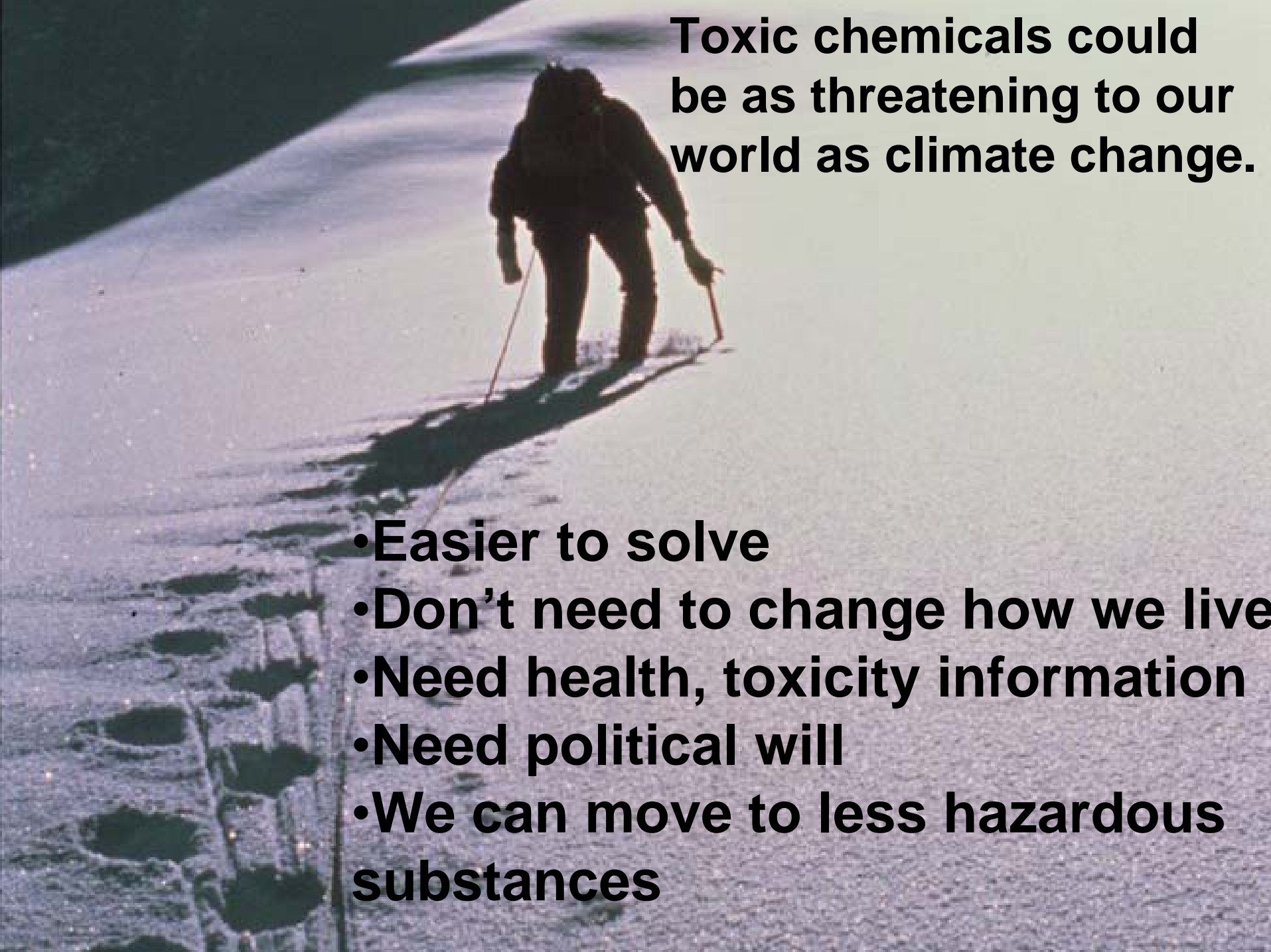
Please sign the e-list
or leave a card.

- **Responsible recycling TVs for 2009**
- **Responsible recycling of toxic foam**
- **Reduction of toxics in building materials**
- **Informing China of costs of using toxic FRs**
- **Support group for REACH in the EU**



www.arleneblum.com

www.greensciencepolicy.org



Toxic chemicals could be as threatening to our world as climate change.

- **Easier to solve**
- **Don't need to change how we live**
- **Need health, toxicity information**
- **Need political will**
- **We can move to less hazardous substances**



Where are all the Fire Retardants Going? To Kids, Cats, and Killer Whales Everywhere. When Will We Ever Learn?



An Optimistic Message

- Toxic chemicals might be as threatening as climate change
- Much easier to solve
- Don't need to change how we live
- Need political will
- Require health & toxicity information
- We can move towards less hazardous substances

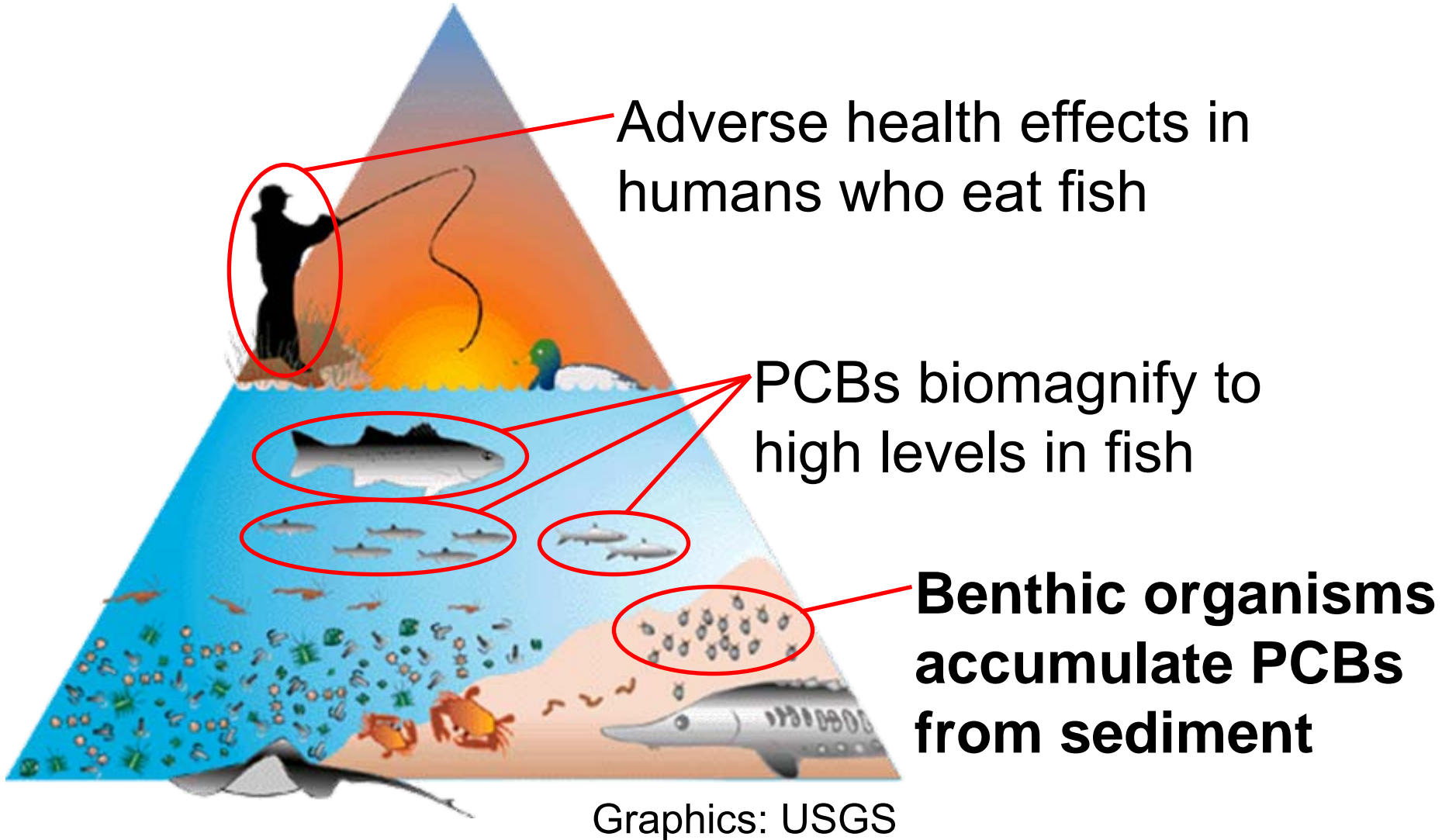
- Do challenges last and transition from chair to our new plan
- Lots of time for successes with details of the votes for the four standards
- New plans
- Tv takeback, insulation, TB117
- China – inform NGOs and decision makers about downsides of FR chemicals
- Israel -- same as China emphasizing Dead Sea Bromine's activities
- EU REACH, RoHS support group
- U.S. Toxic chemical reform and harmonization with REACH

Possible Emerging Contaminants in the SF Estuary

*From the San Francisco Estuary Institute, based on EPA TSCA Inventory 2002

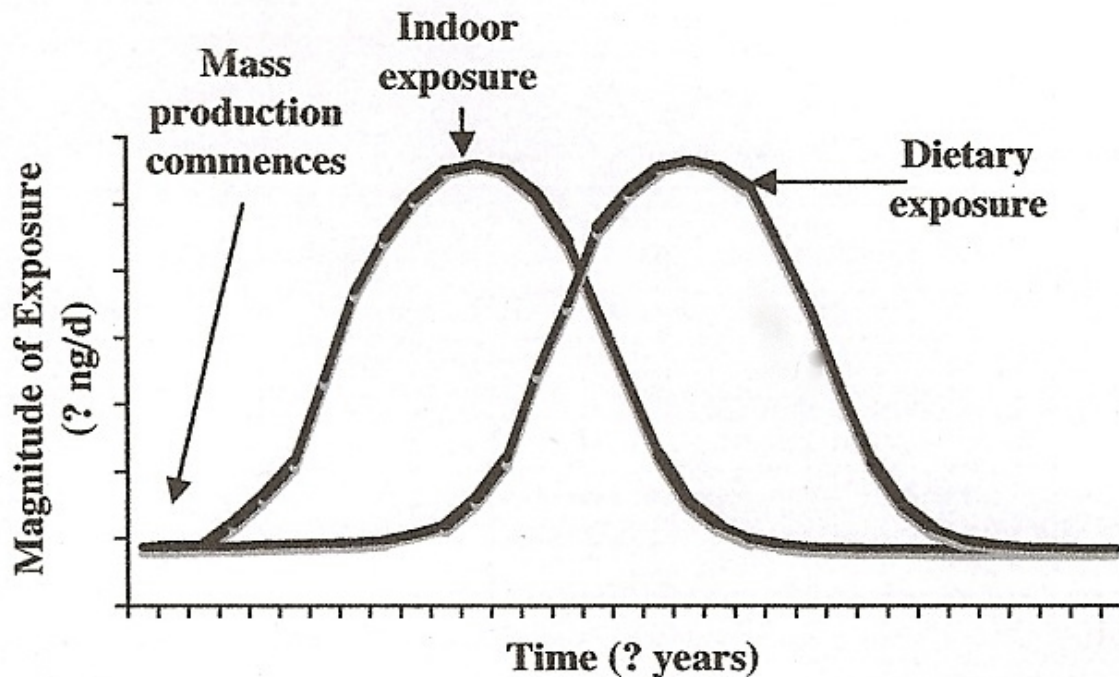
	Production Volume (lbs)*	Bioaccumulation	Persistence	EcoToxicity	Mammalian Toxicity
Tetrabromobisphenol A (TBBPA)	100-500M	Low	Moderate	High	High
Hexabromocyclododecane (HBCD)	10-500K	High	High	High	High
Decabromodiphenylethane (DBDPE)	?	Low	High?	?	?
1,2-Bis(2,4,6-tribromophenoxy)ethane (BTBPE)	1-10M	High?	Moderate?	?	?
Pentabromoethylbenzene (PBEB)	0	Moderate?	Moderate?	?	?
Dechlorane Plus (DP)	1-10M	Low	High	?	?
Tris(1,3-dichloro-2-propyl)phosphate (TDCPP)	10-50M	?	Moderate?	Moderate	High
Triphenylphosphate (TPP)	10-50M	High?	Low?	High	?
Firemaster 550 bis(2-ethylhexyl) tetrabromophthalate	?	?	?	High?	?

Food Web Implications



The PBDE “Time Bomb”

- The indoor reservoir of pentaBDE in furniture is slowly “bleeding” the chemical into the indoor and then the outdoor environment
- Due to atmospheric transport and persistence, it will be magnified in terrestrial and aquatic food chains
- Our main exposure route will shift from indoor air and dust, to our diet



TV Take-Back Campaign

- Millions of American TVs will become obsolete next February, when TV stations switch from analog to digital signals.
- This has the potential to cause an e-waste tsunami of plastic treated with decaBDE into
- our landfills or being burned
- The Electronics TakeBack Coalition (<http://takebackmytv.com>), is leading a campaign to encourage TV manufacturers to offer TV Take-Back programs, under which they will collect their old products and responsibly recycle them
- Sony is the only manufacturer with a TV Take-Back program in the U.S. while other manufacturers, including Panasonic, Sharp, and Philips, continue to lobby against e-waste bills that call for producer responsibility



CPSC: TB117 Doesn't always Improve Fire Safety

- Cover fabric (not foam) is the most important component influencing the ignition behavior
 - TB 116 is a voluntary test of finished products (including cover fabric) and is rarely used
 - TB 117 tests components independently
- Compliance with TB 117 does not necessarily result in ignition resistance for the finished product
 - In testing, fabric ignition times were essentially the same with and without FR foams
 - Similar amounts of both FR (TB 117) and non-FR foams melted during full scale chair tests

Bare foam that passes TB 117 still burns when a fabric covering is added. The cover fabric maintains combustion until the foam becomes fully involved.