



Green Science Policy Institute

Fire Safety without Harm: Changing Flammability Regulations

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无危害消防安全:

改变阻燃法规

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China's Pollution Problem

- Rapid economic growth model: industrialize first, clean up later



- Pollution is the main cause of social unrest in China, with 30,000 to 50,000 mass protests every year
- 80% of Chinese surveyed believe environmental protection should be a higher priority than economic development

China Declares War on Pollution

“Environmental pollution has become a major problem which is nature’s red-light warning against the model of inefficient and blind development. (...) We must strengthen protection of the ecological environment and resolve to take forceful measures.”

- Chinese Premier Li Keqiang, 2014



1970s U.S. Flammability Standards that needed to be updated

- Children's sleepwear
- Furniture
- Foam plastic building insulation

20世纪70年代美国的阻燃标准需要被更新

- 儿童睡衣
- 家具
- 泡沫塑料建筑保温材料

Brominated Tris Flame Retardant

Tris (2,3-dibromopropyl) phosphate

- In children's sleepwear 1975 to 1977
- Up to 10% of the weight of fabric
- In children's urine
- Mutagen and possible carcinogen



溴化Tris阻燃剂

三(2,3-二溴丙基)磷酸酯

- 被添加到儿童睡衣 1975 to 1977
- 达到织物重量的10%
- 在儿童尿液中被检测到
- 基因突变和可能的致癌物质



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

防火阻燃剂有导致癌症的危险
儿童睡衣中添加的阻燃剂可能导致畸变, 应该被禁止



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

TRIS-Treated Children's Garments Banned

April , 1977

Chlorinated Tris replaced Brominated Tris

- Removed from pajamas in 1978
- Used in furniture until 2012



U.S. Consumer Product
Safety Commission

美国消费品企业安全委员会

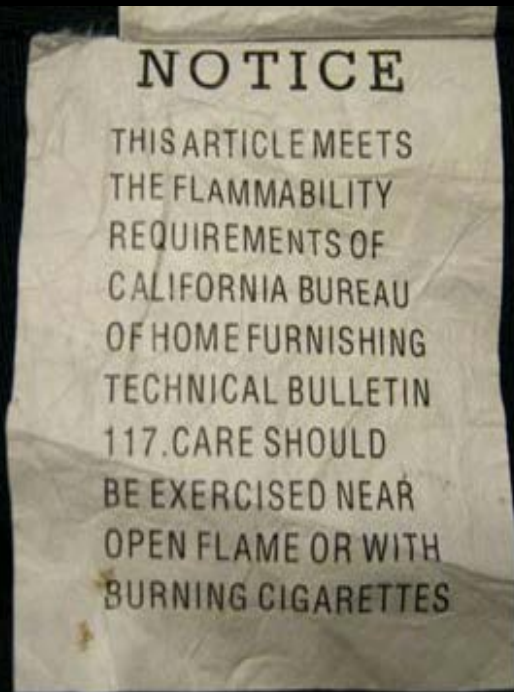
添加了TRIS的儿童服装被禁止

1977年4月

氯化的Tris取代溴化的Tris

- 1978年从睡衣中去除
- 应用于家具, 直到2012年止

Technical Bulletin 117



- Furniture foam must withstand a small open flame for 12 seconds
- No significant fire safety benefit (fires start in exterior fabric not filling)

技术公告117



- 家具泡沫塑料必须能够承受持续12秒的小明火
- 没有显著消防安全效益（大火从外部面料开始而不是内部）

Animal health effects

- Chronic toxicity: long term impacts
 - **Endocrine disruption:** Interfere with thyroid hormones
 - **Neurodevelopment:** Decreased memory, learning deficits, hyperactivity
 - **Reproductive system effects:** Reduced ovarian follicles, reduced sperm count, infertility
 - **Immune suppression**
 - **Cancer**

动物健康的影响

- 慢性毒性：长期影响
 - 内分泌紊乱：干扰甲状腺激素
 - 神经发育：记忆力减退，理解力下降，多动症
 - 生殖系统的影响：卵泡减少，精子数量减少，不孕不育
 - 免疫抑制
 - 癌症

Human Health

Higher pentaBDE



associated with

lower birth weight
impaired attention
poorer coordination
lowered IQ

longer time to get pregnant
altered thyroid hormones



人类健康

高浓度 pentaBDE



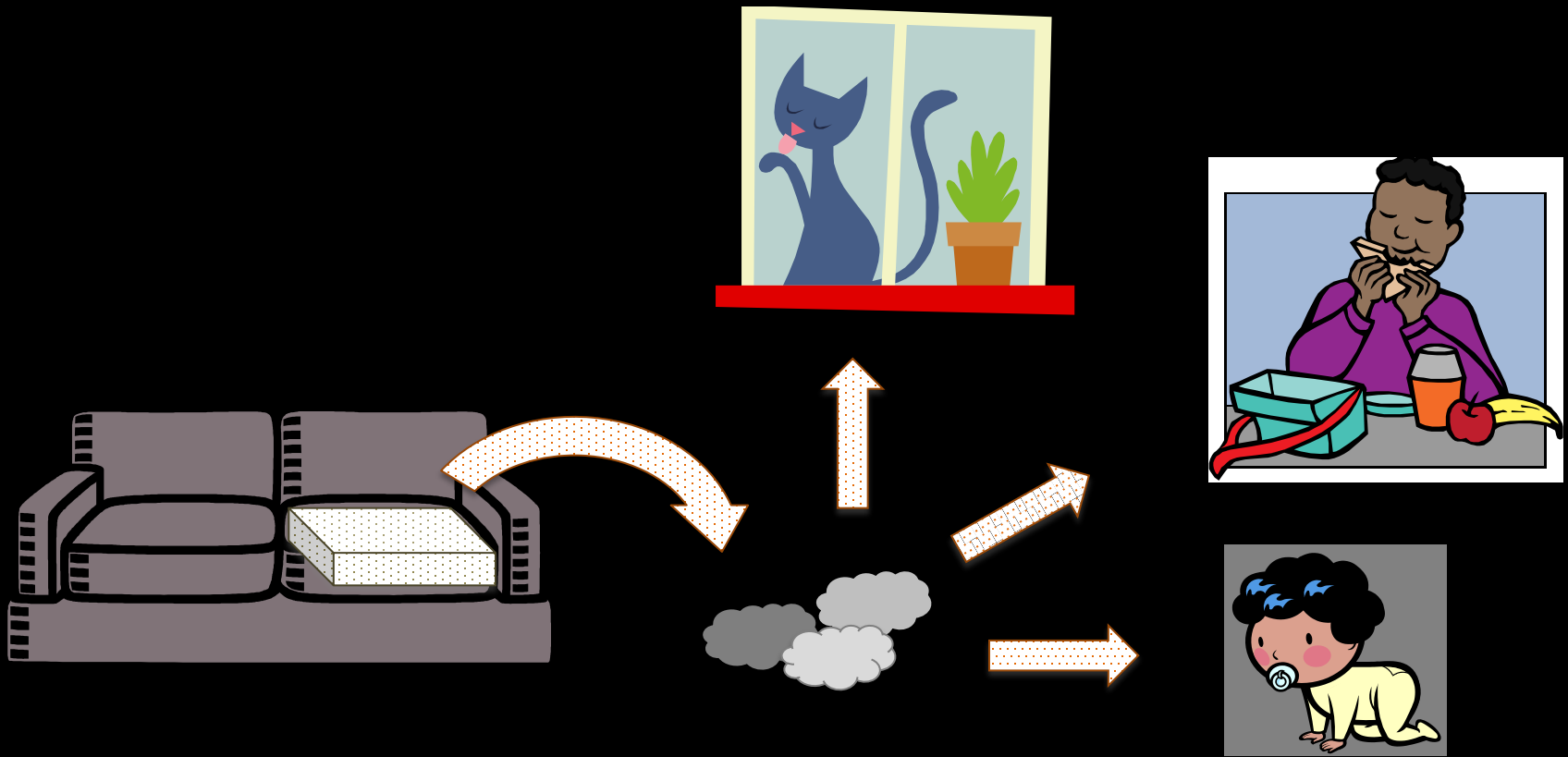
与其关联

出生时较小的体重
注意力受损
身体协调能力差
智商较低

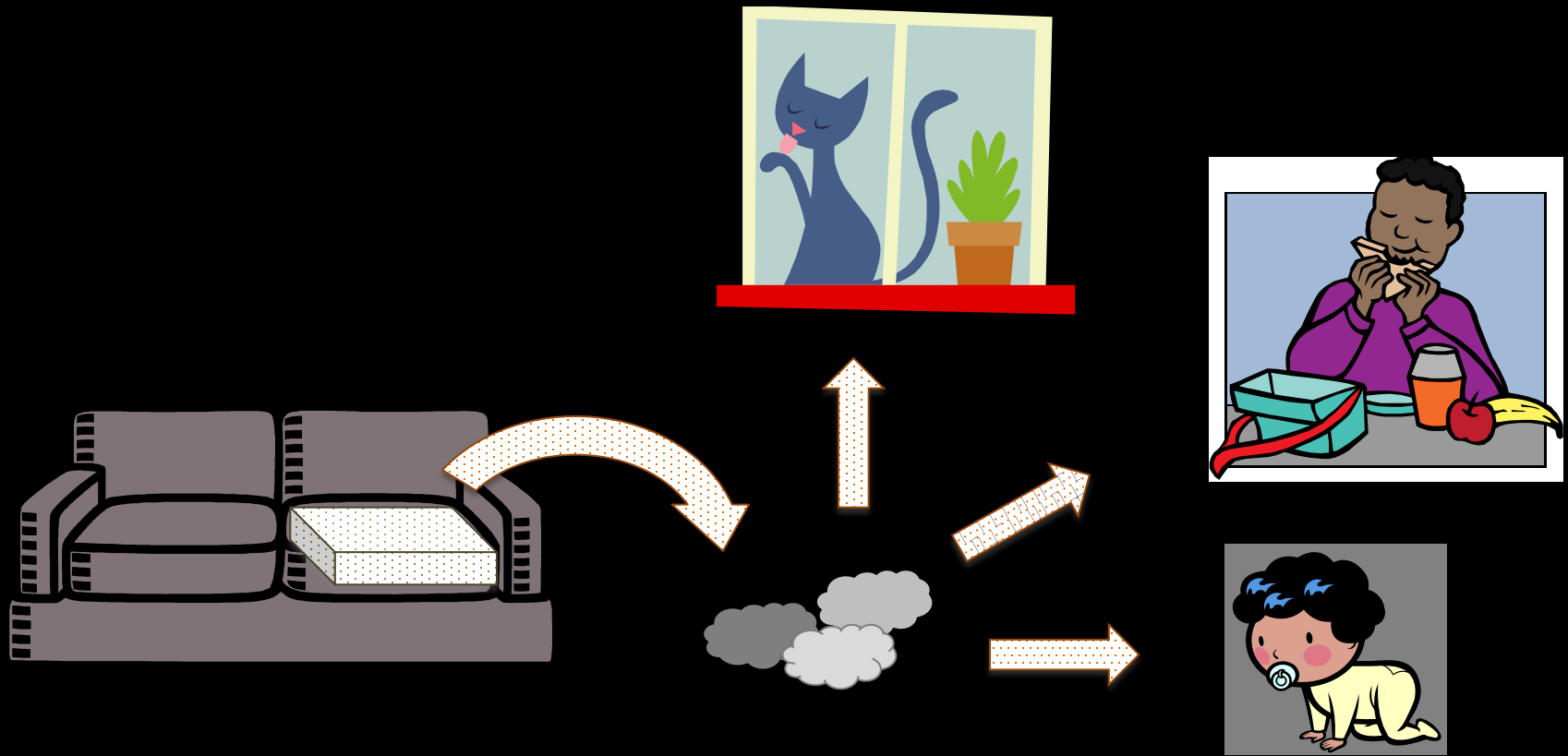
需要更长时间才能怀孕
由于改变的甲状腺激素水平



From Products to People



从产品到人



Global pollutants

Migrate towards north and south poles



全球污染物

迁移至南北两极

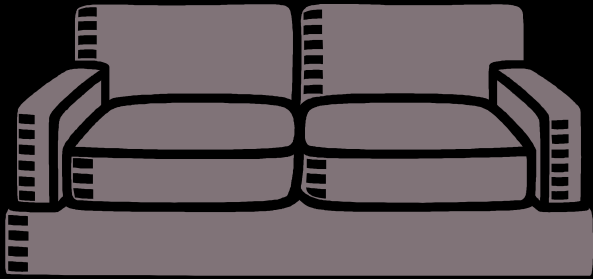




97 ppm to 3 ppm

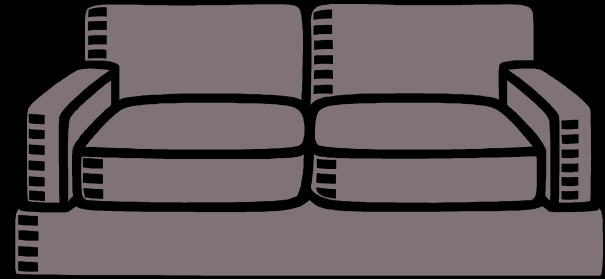
TB117 Fire Safety Benefit?

TB117 foam



~

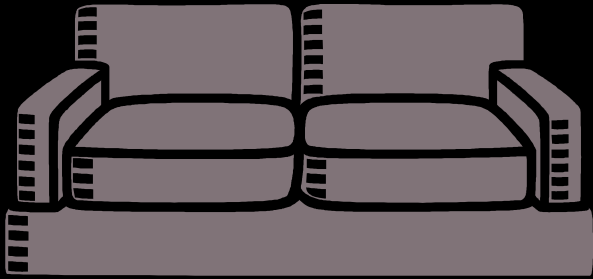
Non - TB117 foam



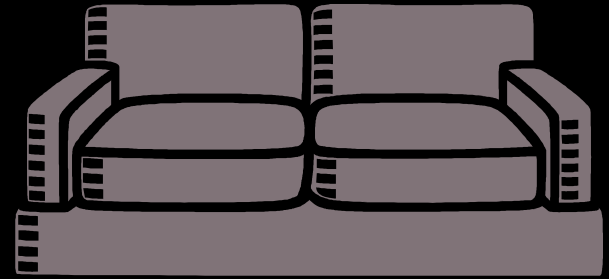
“No significant, consistent difference...”

TB117 的消防安全效益?

TB117 泡沫塑料



非 TB117 泡沫塑料



“没有显著的, 一致的差异...”



TRIBUNE WATCHDOG

Playing with fire

A deceptive campaign by industry brought toxic flame retardants into our homes and into our bodies. And the chemicals don't even work as promised.

BY PATRICIA CALLAHAN AND SAM ROE
Tribune reporters

Dr. David Heimbach knows how to tell a story. Before California lawmakers last year, the noted burn surgeon drew gasps from the crowd as he described a 7-week-old baby girl who was burned in a fire started by a candle while she lay on a pillow that lacked flame retardant chemicals.

"Now this is a tiny little person, no bigger than my Italian greyhound at home," said Heimbach, gesturing to approximate the baby's size. "Half of her body was severely burned. She ultimately died after about three weeks of pain and misery in the hospital."

Heimbach's passionate testimony about the baby's death made the long-term health concerns about flame retardants voiced by doctors, environmentalists and even firefighters sound abstract and petty.

But there was a problem with his testimony: It wasn't true. Records show there was no dangerous pillow or candle fire. The baby he described didn't exist.

Neither did the 9-week-old patient who Heimbach told California legislators died in a candle fire in 2009. Nor did the 6-week-old patient who he told Alaska lawmakers was fatally burned in her crib in 2010.

Heimbach is not just a prominent burn doctor. He is a star witness for the manufacturers of flame retardants.

His testimony, the Tribune found, is part of a decades-long campaign of deception that has loaded the furniture and electronics in American homes with pounds of toxic chemicals linked to cancer, neurological deficits, developmental problems and impaired fertility.

The tactics started with Big Tobacco, which wanted to shift focus away from cigarettes as the cause of fire deaths, and continued as chemical companies worked to preserve a lucrative market for their products, according to a Tribune review of thousands of government, scientific and internal industry

stoked the public's fear of fire and helped organize and steer an association of top fire officials that spent more than a decade campaigning for their cause.

Today, scientists know that some flame retardants escape from household products and settle in dust. That's why toddlers, who play on the floor and put things in their mouths, generally have far higher levels of these chemicals in their bodies than their parents.

Blood levels of certain widely used flame retardants doubled in adults every two to five years between 1970 and 2004. More recent studies show levels haven't declined in the U.S. even though some of the chemicals have been pulled from the market. A typical American baby is born with the highest recorded concentrations of flame retardants among infants in the world.

People might be willing to accept the health risks if the



Pulitzer Prize
Finalist

Goldsmith Prize
Investigative Reporting

Environmental
Journalists Society
Environmental Reporting

National Press Club
Consumer Award



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玩火

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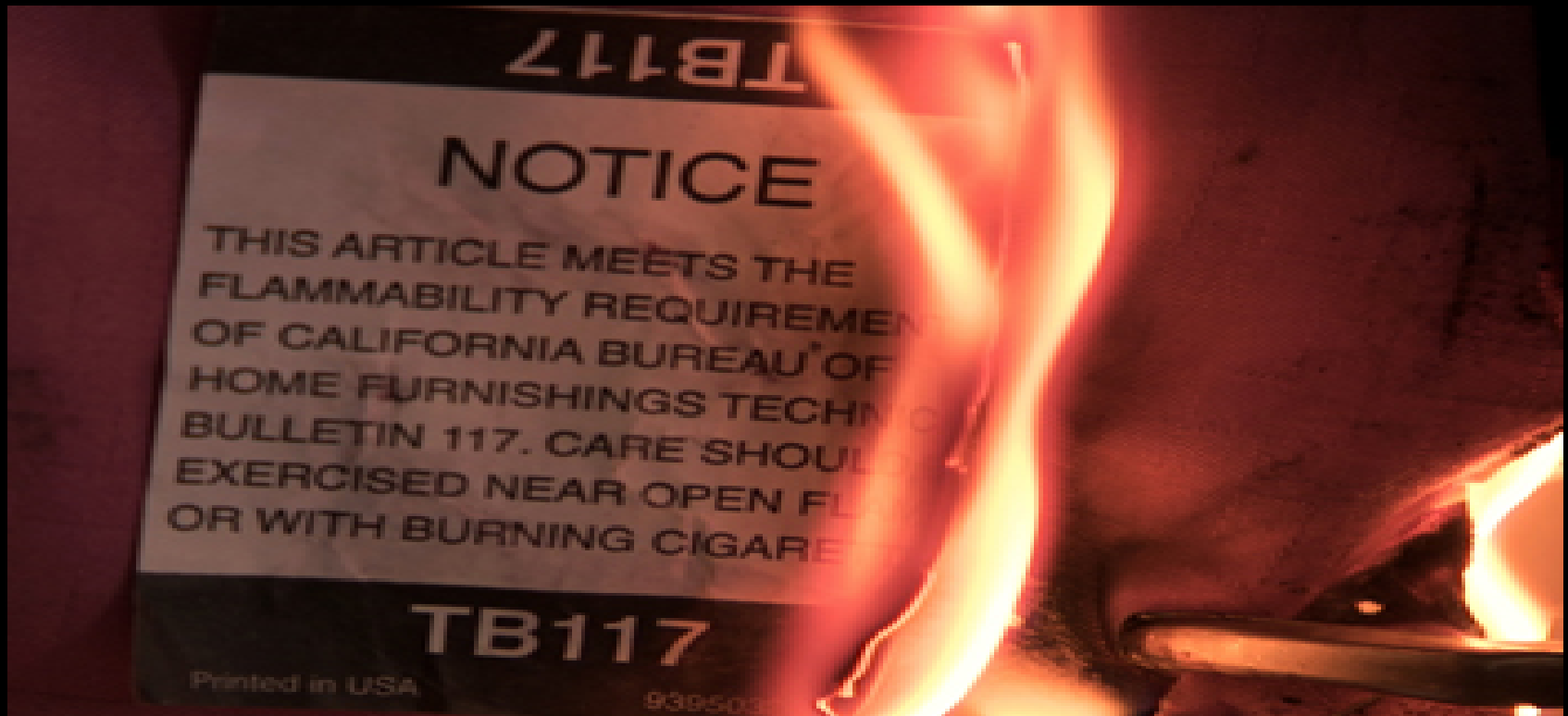
普利策奖
入围

金匠奖
调查报告

环境新闻工作者协会
环境报告

全国新闻俱乐部
消费者奖

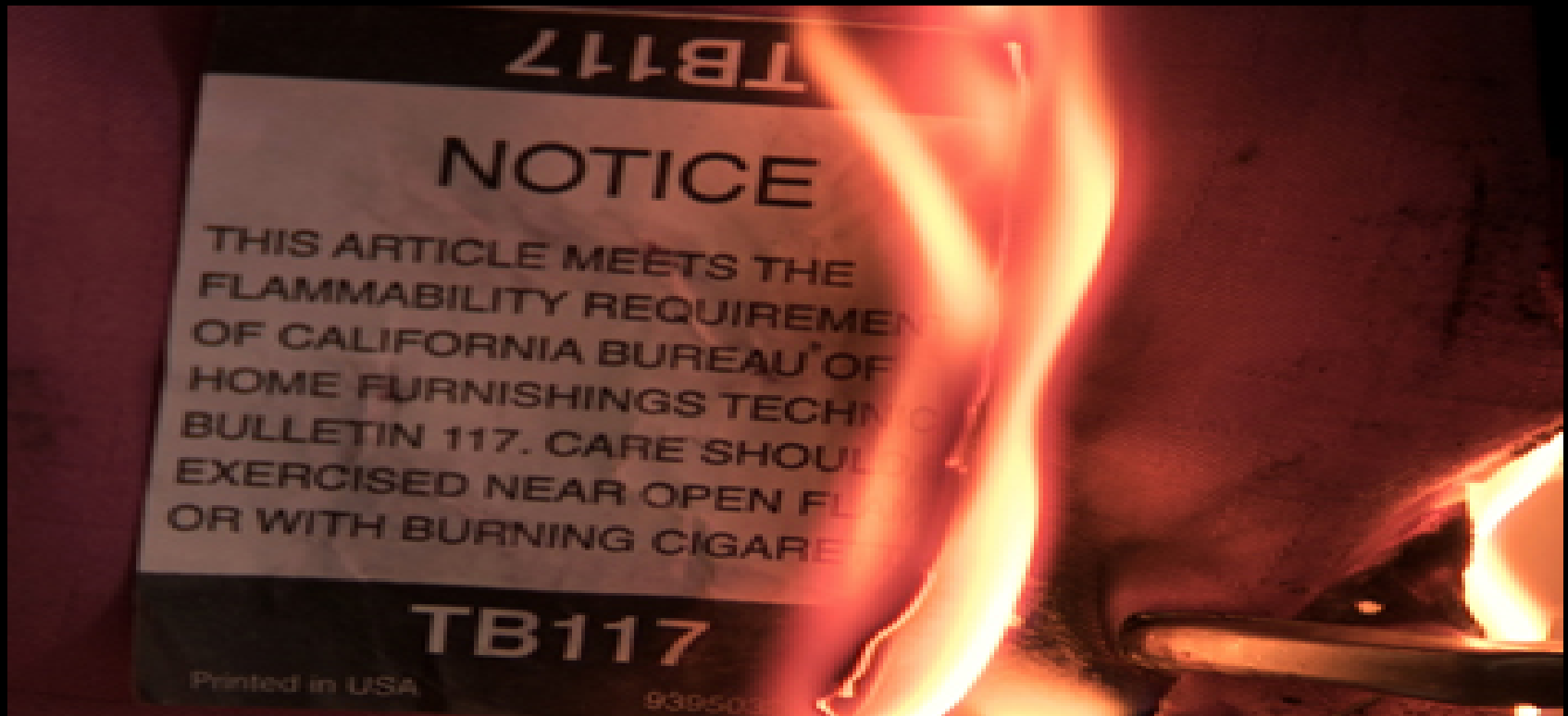
Toxic Hot Seat



A film about stopping the use of flame retardants

Rent it at <http://vimeo.com/ondemand/toxichotseat>

有毒的热座椅



关于停止使用阻燃剂的电影

在此处可租 <http://vimeo.com/ondemand/toxichotseat>



Office of Governor

Edmund G. Brown Jr.



June 18, 2012

Governor Brown Directs State Agencies to Revise Flammability Standards

“We must find better ways to meet fire safety standards by reducing and eliminating dangerous chemicals.”



Office of Governor

Edmund G. Brown Jr.



2012年6月18日

•州长布朗指导州政府机关修改易燃性标准

“我们必须找到更好的方法来满足消防安全标准，减少和消除危险化学品。”

California Flammability Standard TB117-2013

- January 1, 2015
- Flame retardants not needed, but can still be used

加州可燃性标准TB117-2013

– 2015年1月1日

– 不需要阻燃剂, 但仍然可以使用

California Flammability Standard

- Pillows
- Comforters,
- Mattress pads

Suspended



NOTICE OF SUSPENSION

**Technical Bulletin 604
Proposed Flammability Test Method
for Bedclothing Products**

The Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation (Bureau) has suspended its effort to begin the formal rulemaking process to implement Technical Bulletin 604, the proposed flammability standard for filled bedclothing products.

加州的可燃性标准

- 枕头
- 被子
- 床罩

暂停添加



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When Product Safety and the Environment Appear to Collide:
**The Defeat of the Candle
Flame Ignition Requirement**

by Michael Kirschner, Design Chain Associates, and
Arlene Blum, Ph.D., Green Science Policy Institute

Conformity, January 2009



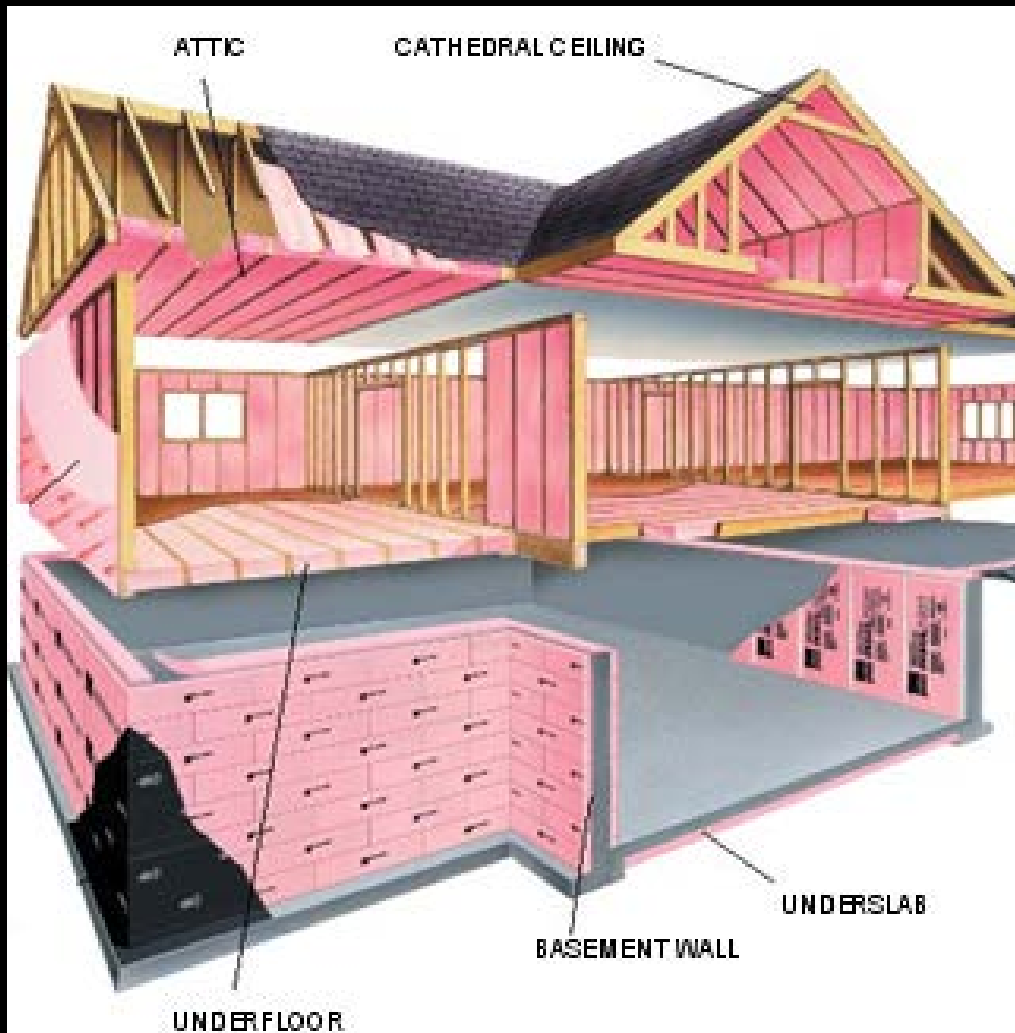
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Foam Plastic Insulation

(polystyrene, polyurethane, polyiso, etc.)



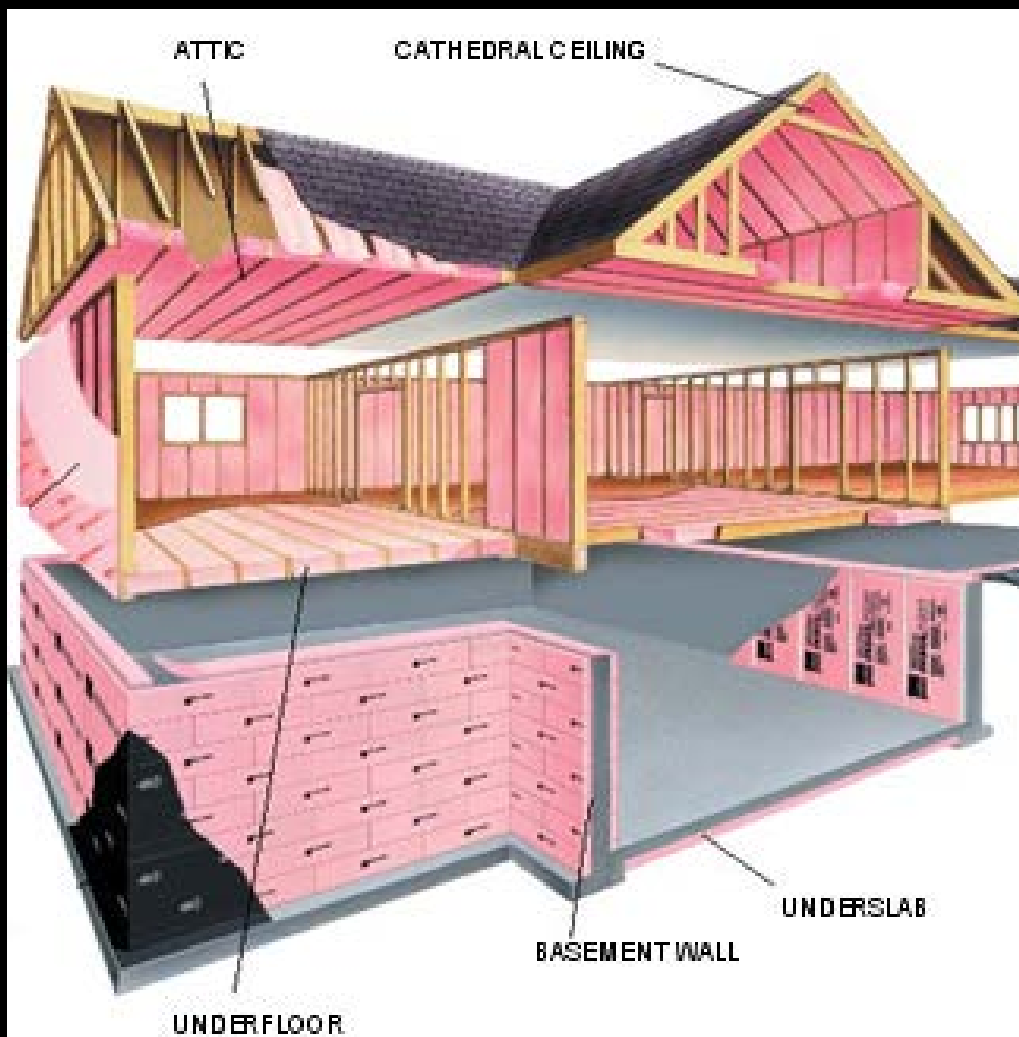
Used increasingly for energy efficiency

Can be used:

- inside walls
- below grade
- attics, etc.

泡沫塑料隔热材料

(聚苯乙烯, 聚氨酯, 多异, 等等.)



由于节约能源而使用率大大增加

可以用于:

- 内壁
- 地下保温层
- 阁楼, 等等.

HBCD

(hexabromocyclododecane)

HBCD:

- Bioaccumulative
- Thyroid disruption
- Affects developing nervous system
- Developmental neurotoxicity in mice
- Banned in 160 countries

Polystyrene (XPS and EPS)



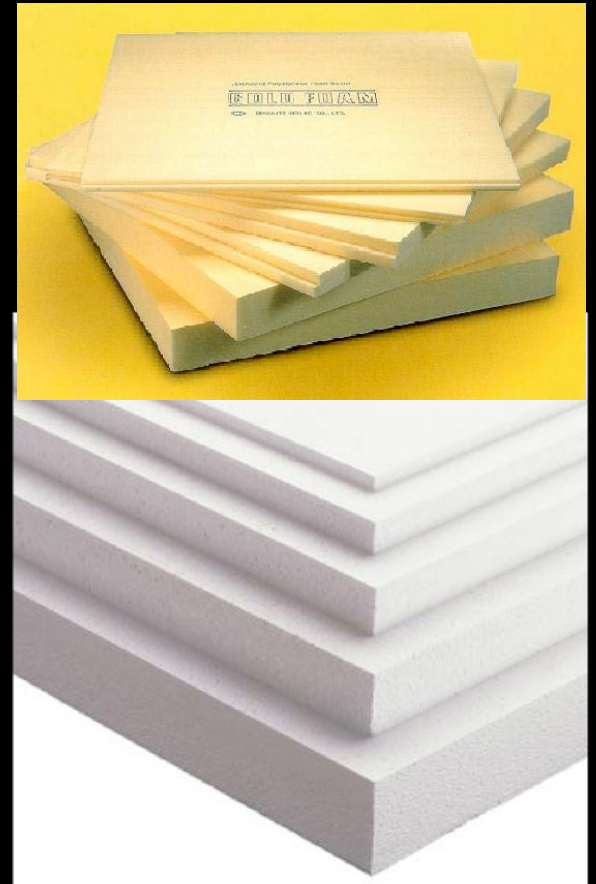
HBCD

(六溴环十二烷)

HBCD:

- 生物富集性
- 甲状腺破坏
- 影响神经系统发育
- 在小鼠中发现发育神经毒性
- 在160个国家被禁止

Polystyrene
(XPS and EPS)



HBCD is a persistent organic pollutant (POP)



STOCKHOLM
CONVENTION

Protecting human health and the environment
from persistent organic pollutants



19 October 2012, Geneva— A UN expert body has recommended that the industrial flame retardant hexabromocyclododecane (HBCD) be eliminated from the global marketplace to protect human health and the environment.

HBCD 是持久性有机污染物 (POP)



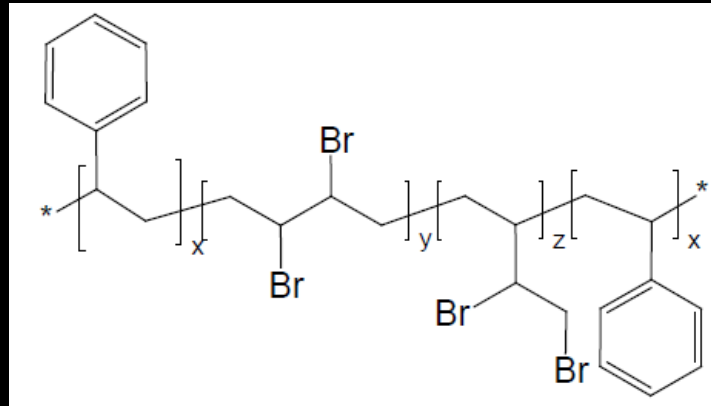
STOCKHOLM
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2012年10月19日, 日内瓦— 一个联合国专家机构建议, 工业阻燃剂HBCD在全球市场被淘汰, 以保护人类健康和环境

PolyFR is the Replacement



Brominated butadiene styrene copolymer



“Emerald Innovation 3000”

2014

10,000 tons/ year



“GreenCrest”

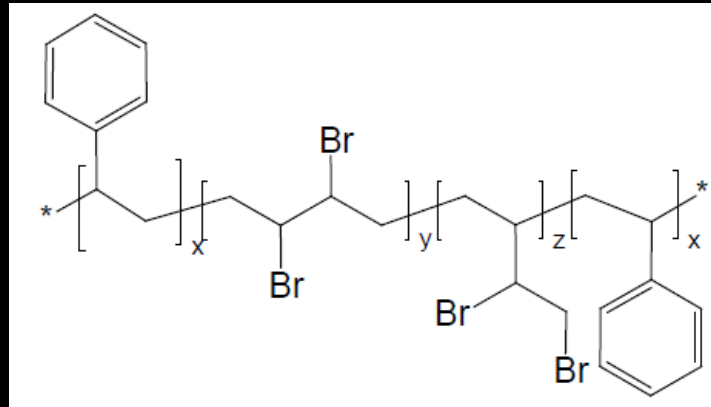
Began production



“FR-122P”

10,000 tons/ year

PolyFR 是替代品



溴化丁二烯 - 苯乙烯共聚物



“Emerald Innovation 3000”

2014

10,000 吨/ 年



“GreenCrest”

开始生产



“FR-122P”

10,000 吨/ 年

California Assembly Bill 127

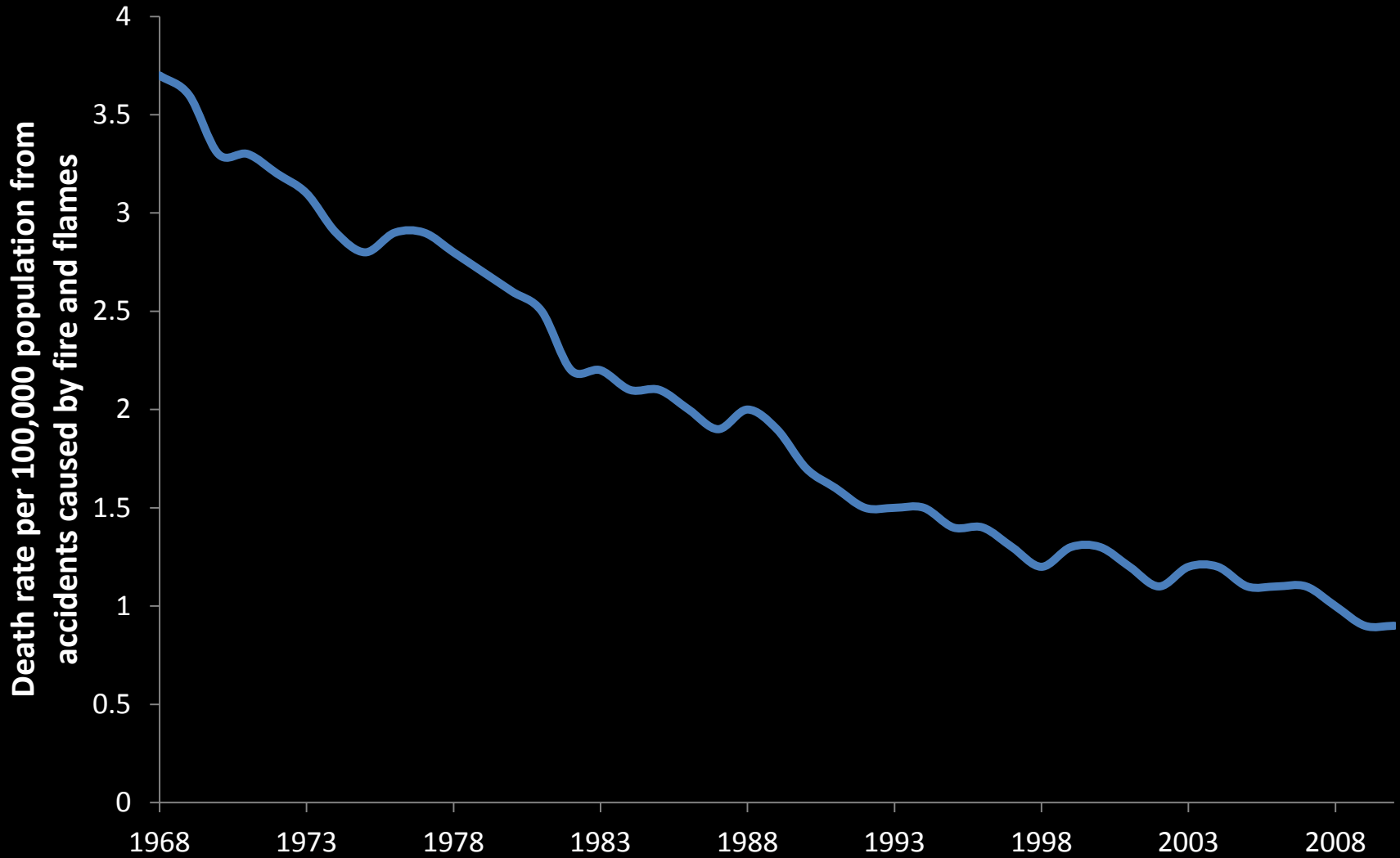
Review of insulation flammability standards

- State fire marshal may propose updates that:
 - Maintain overall fire safety
 - Provide flexibility in meeting fire safety standards without chemical flame retardants

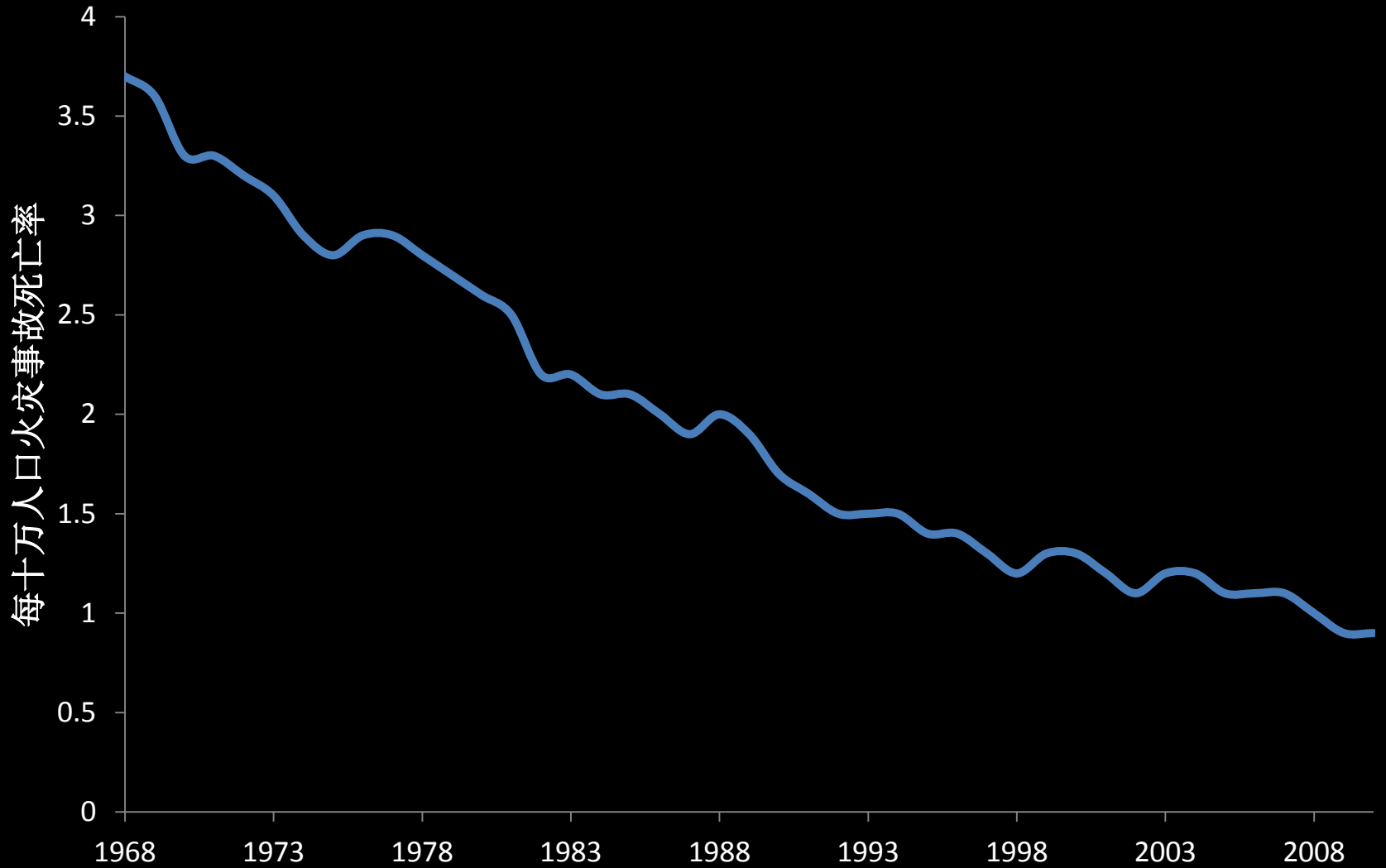
加州议会法案127 回顾保温阻燃标准

- 加州消防办公厅提出更新的：
 - 维持整体消防安全
 - 提供更灵活的达到消防安全标准的非化学阻燃剂

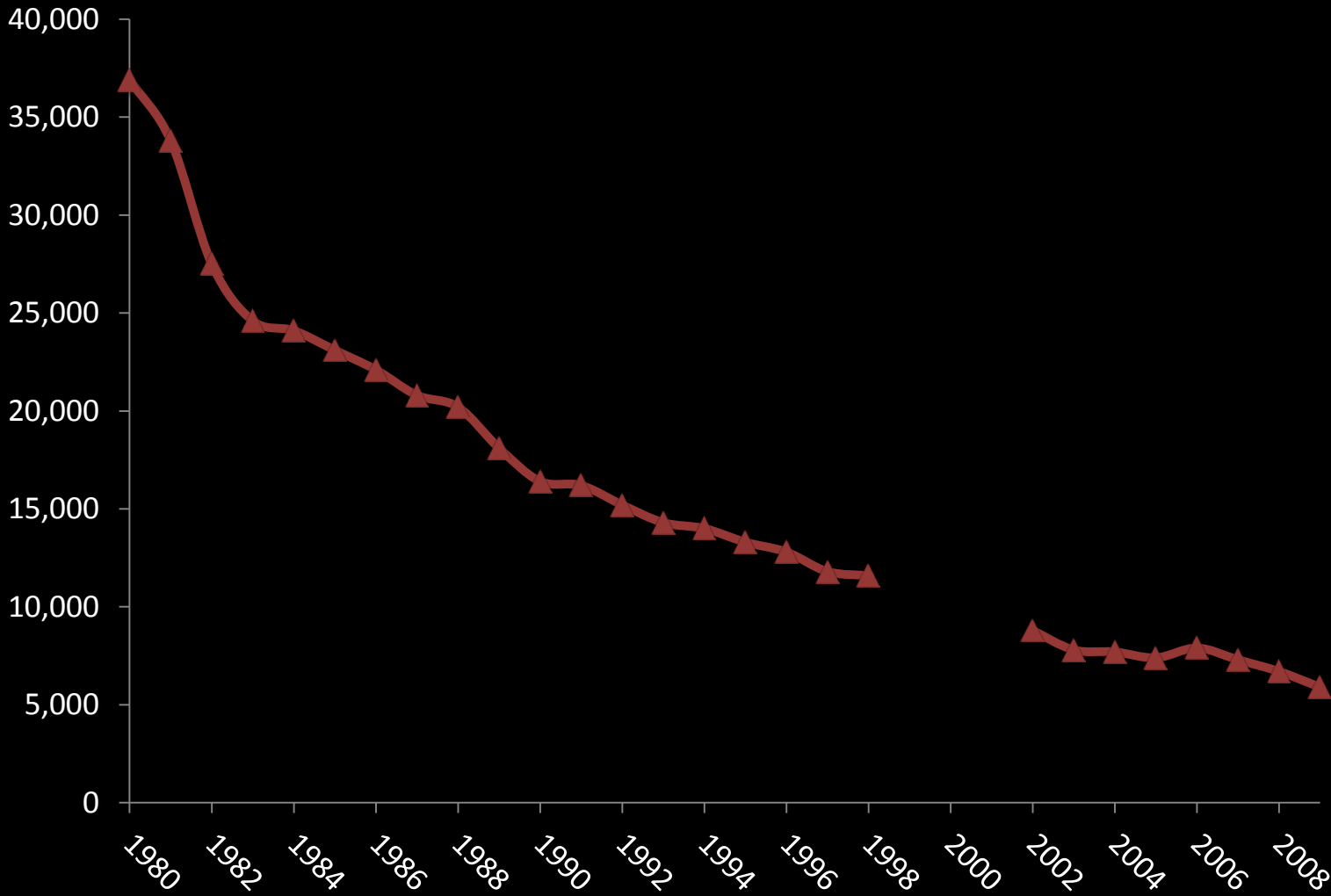
Rate of U. S. fire deaths decreasing



美国火灾死亡率减少

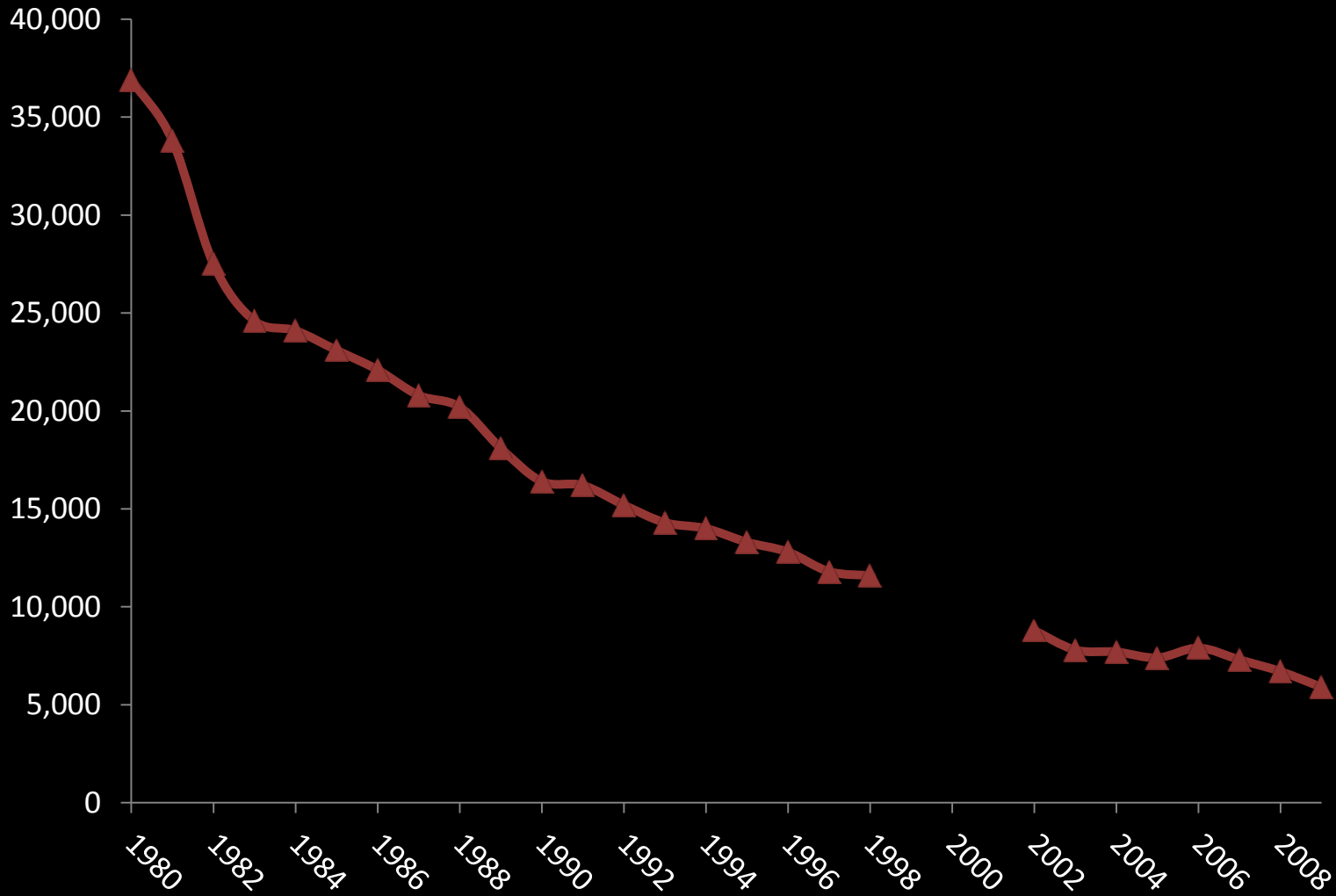


Fires starting in furniture decreasing in U.S.



Home structure fires
that began with upholstered furniture

美国家具起火率在减少.



由于家具起火引起的房屋火灾

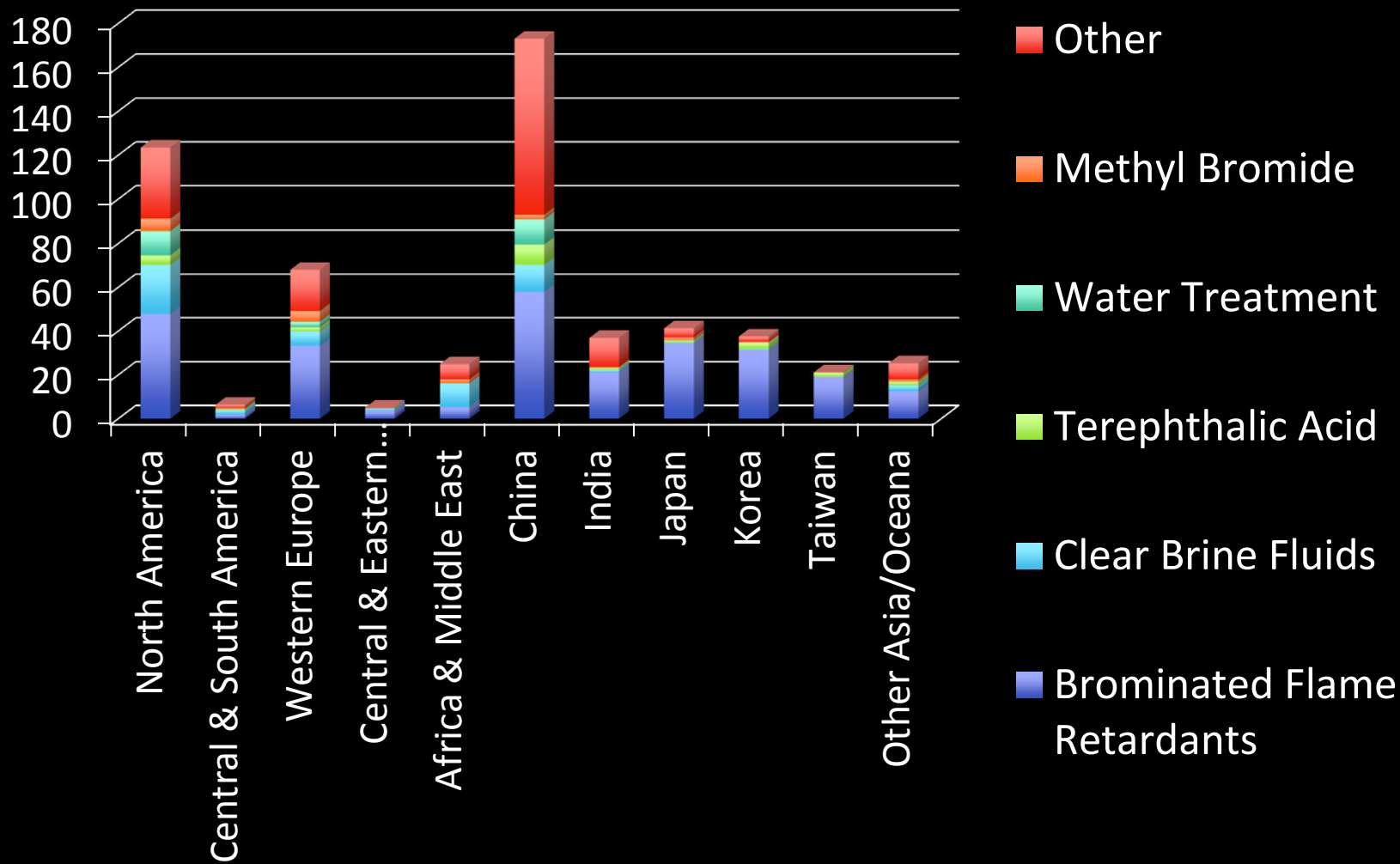
Fire safety tools

- Decrease in smoking
- Fire-safe cigarettes
- Fire-safe candles,
- Child-safe lighters
- Smoke detectors/alarms
- Sprinklers
- Fire codes
- Fire safety education

消防安全工具

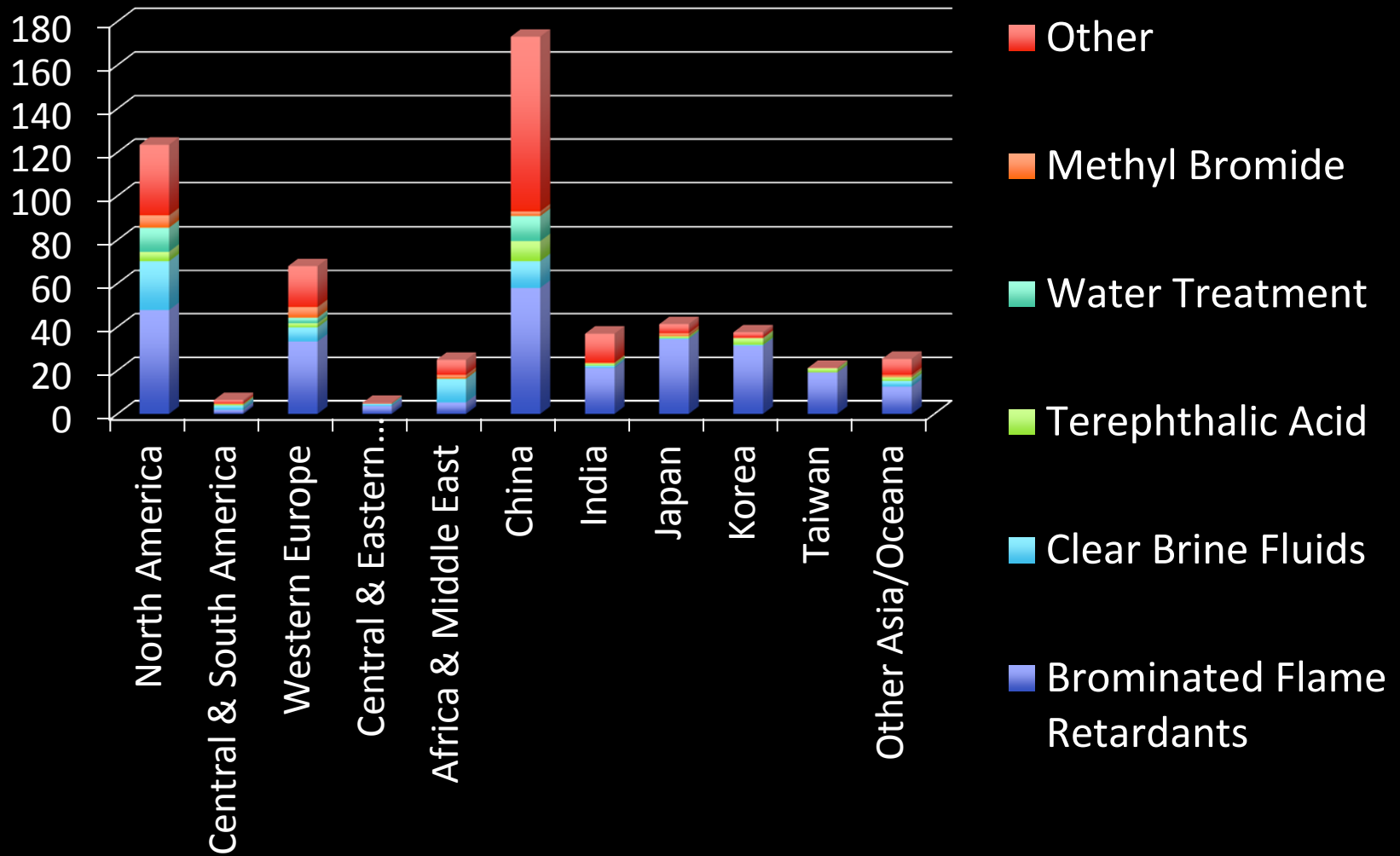
- 减少吸烟
- 防火安全香烟
- 防火安全蜡烛
- 儿童安全打火机
- 烟雾探测器/报警器
- 洒水喷头
- 消防规范
- 防火安全教育

World Consumption of Bromine by End Use (2008 data)




(Source: Chemical Economics Handbook, 2009)

全世界溴代阻燃剂的消费 (截至2008年 数据)




(Source: Chemical Economics Handbook, 2009)



For more information
www.greensciencepolicy.org
to join our e-list

**Please give Arlene your card
Or sign our e-list**

A high-altitude mountain peak with a climber on a snowy ridge under a bright sun. The climber is wearing a yellow helmet and dark gear, and is secured by ropes. The sun is in the upper left corner, creating a lens flare effect. The sky is a deep blue.

更多信息参见

www.greensciencepolicy.org

加入我们的email列表

请给Arlene 你的名片
或者注册我们的e-list

With improved flammability standards

**We can have both fire safety
and a healthy world.**

Google: Green Science Policy
www.GreenSciencePolicy.org

A scenic mountain landscape featuring a dirt path on the left, a field of wildflowers in the foreground, and a snow-capped mountain peak in the distance under a clear blue sky.

凭借改进的阻燃标准

我们可以兼得消防安全
和一个健康的世界。

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