



GREEN SCIENCE
POLICY INSTITUTE

Improved Flammability Standards For Fire Safety and Health

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Executive Director, Green Science Policy Institute

April 11, 2018







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













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

TRIS-Treated Children's Garments Banned

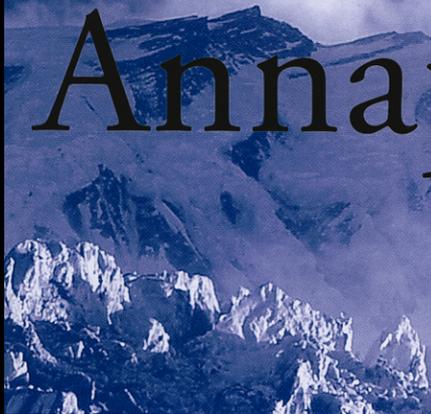
April , 1977

Chlorinated Tris replaced Brominated Tris

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

Annapurna

A WOMAN'S PLACE



The dramatic
story of the first
American ascent of
one of the world's
highest peaks



ARLENE BLUM

20TH ANNIVERSARY EDITION

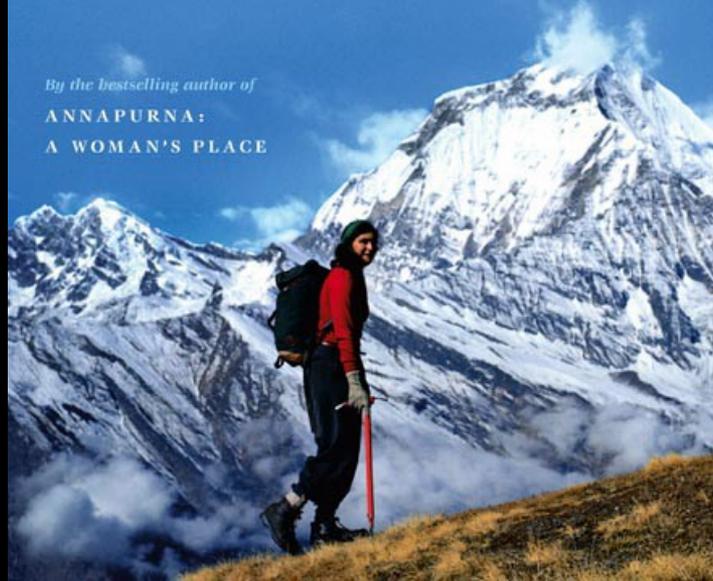
With a new Preface and Afterword by the author

Arlene Blum

BREAKING TRAIL

A Climbing Life

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





GREEN SCIENCE POLICY INSTITUTE



Research



Education



Coalition-Building

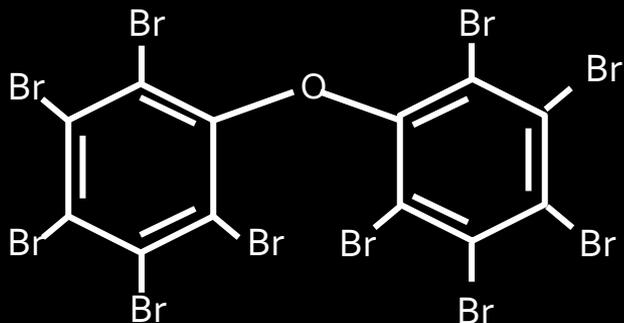
Policy & Purchasing Change

U.S. Toxic Substances Control Act (1976)

- 62,000 previous chemicals “grandfathered”
- 23,000 new chemicals
 - 85% have no health data
 - 67% have no data at all



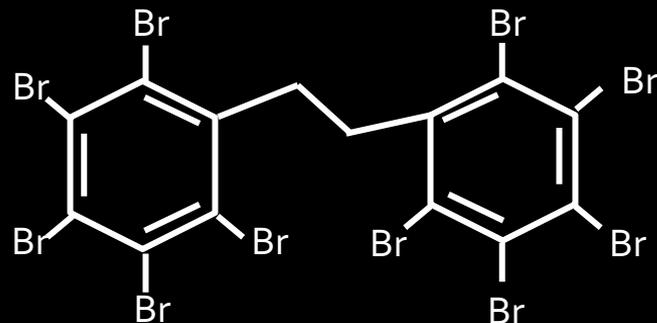
Regrettable Substitution



Decabromodiphenyl
ether

Concerns:

- Persistence
- Bioaccumulation
- Toxicity



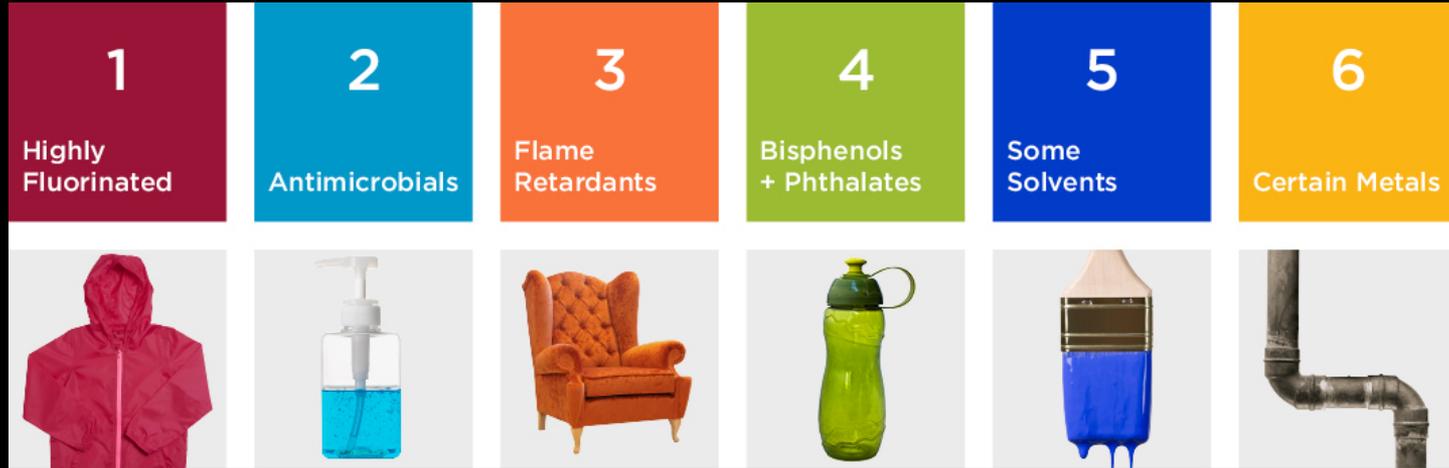
Decabromodiphenyl
ethane

Concerns:

- Persistence
- Bioaccumulation
- Toxicity

Six Classes Videos

An innovative approach to reducing toxics



VIEW and SHARE: www.SixClasses.org

Healthier products, healthier people in four minutes!

Is it necessary?

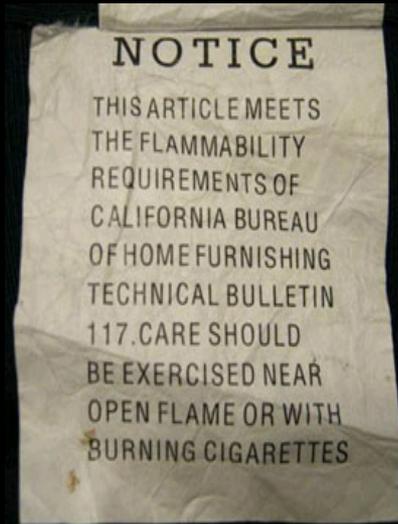
Is it worth it?

Is there a safer alternative?

Updating Flammability Standards

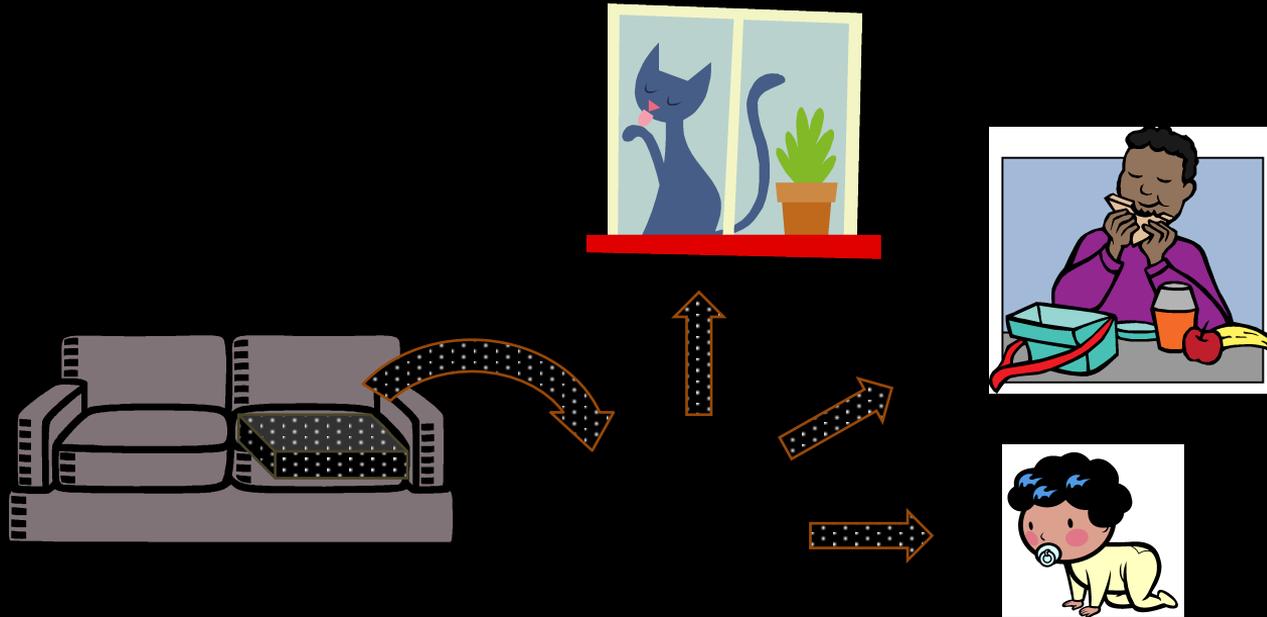
- Children's sleepwear -- 1976
- Furniture and baby product foam -- 2014
- Foam plastic building insulation --?

Technical Bulletin 117



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

From Products to People



Furniture foam flame retardant (PentaBDE) associations with human health problems



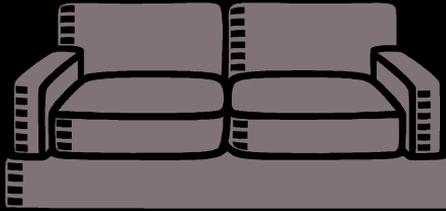
Increased time to pregnancy
Altered thyroid hormone
Thyroid disease in women



Lower birth weight
Lower IQ
Impaired attention
Poorer coordination
Baby boys' genital problems
Delayed puberty in girls
Earlier puberty in boys

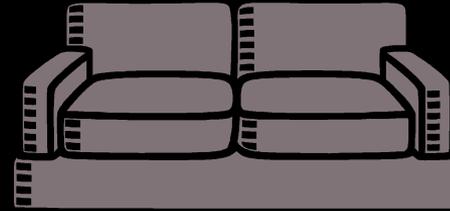
TB117 Fire Safety Benefit?

TB117
foam



~

Non - TB117 foam



“No significant, consistent difference...”

Flame retardants can increase smoke toxicity more than they reduce fire growth

Flame retardants delay, but don't prevent foam from burning

Flame retardants can increase:



- Soot and Smoke
- Carbon Monoxide and Hydrogen Cyanide
- Dioxins and Furans

Increased fire safety without flame retardants



Assembly Bill 706, Senate Bill 772, Senate Bill 1291, Senate Bill 147

A DEADLY MISTAKE

Help stop the bill that will ban material used to make flame resistant products.

CALL YOUR STATE SENATOR TODAY AND TELL THEM TO
VOTE NO ON AB 706

Call State Senator
Tom Torlakson
at **916-651-4007** and tell him to
VOTE NO on AB 706.

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Permit #275

**DON'T LET THE SACRAMENTO POLITICIANS BAN THE USE OF
PROVEN FLAME RETARDANTS-IT COULD BE A DEADLY MISTAKE**

Paid for by Californians for Fire Safety:

- Albemarle
- Chemtura
- Israel Chemicals LTD (ICL)

Pulitzer Prize
Finalist

Goldsmith Prize
Investigative Reporting

Environmental
Journalists Society
Environmental Reporting

Gerald Loeb Award
Business and Financial
Journalism

National Press Club
Consumer Award



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 retired 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 approximately 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

staked 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



California Flammability Standard TB117-2013

Mandatory January 1, 2015

Flame retardants not needed,
but can still be used

Product Labels Required

NOTICE

THIS ARTICLE MEETS THE FLAMMABILITY REQUIREMENTS OF CALIFORNIA BUREAU OF ELECTRONIC AND APPLIANCE REPAIR, HOME FURNISHINGS AND THERMAL INSULATION TECHNICAL BULLETIN 117-2013. CARE SHOULD BE EXERCISED NEAR OPEN FLAME OR WITH BURNING CIGARETTES.

The upholstery materials in this product:

contain added flame retardant chemicals

contain NO added flame retardant chemicals

The State of California has updated the flammability standard and determined the fire safety requirements for this product can be met without adding flame retardant chemicals. The State has identified many flame retardant chemicals as being known to, or strongly suspected of, adversely impacting human health or development.



Office of Governor

Edmund G. Brown Jr.



Governor Brown Directs State Agencies to Revise Flammability Standards

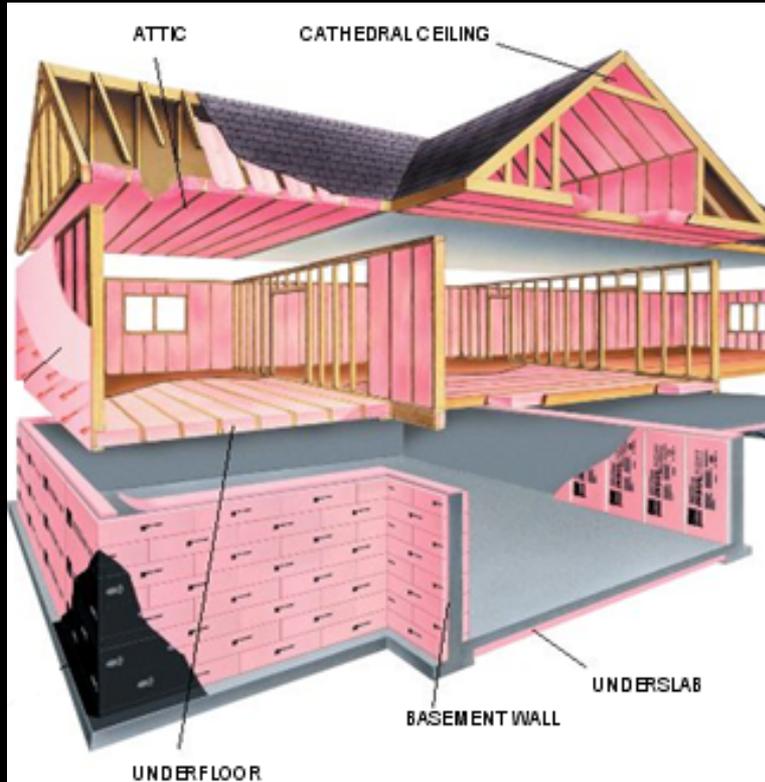
‘We must find better ways to meet fire safety standards by reducing and eliminating - wherever possible - dangerous chemicals.’

Updating Flammability Standards

- Children's sleepwear -- 1976
- Furniture and baby product foam -- 2013
- Foam plastic building insulation -- 2019?

Are flame retardants necessary
in foam plastic building insulation?

Plastic foam insulations (polystyrene, polyurethane, polyiso, etc.)



Used increasingly for energy efficiency

Can be used:

- inside walls
- below grade
- attics, etc.

Building codes drive use of flame retardants in insulation.



BUILDING RESEARCH & INFORMATION (2012) 40(6), 738–755

Routledge
Taylor & Francis Group

INFORMATION PAPER

Flame retardants in building insulation: a case for re-evaluating building codes

Vytenis Babrauskas¹, Donald Lucas², David Eisenberg³, Veena Singla⁴,
Michel Dedeo⁴ and Arlene Blum^{4,5}

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Review Makes Case for Reduced FR Use

- ASTM E84 is required for all U.S. foam plastic building insulation
- This requirement cannot be met without flame retardants

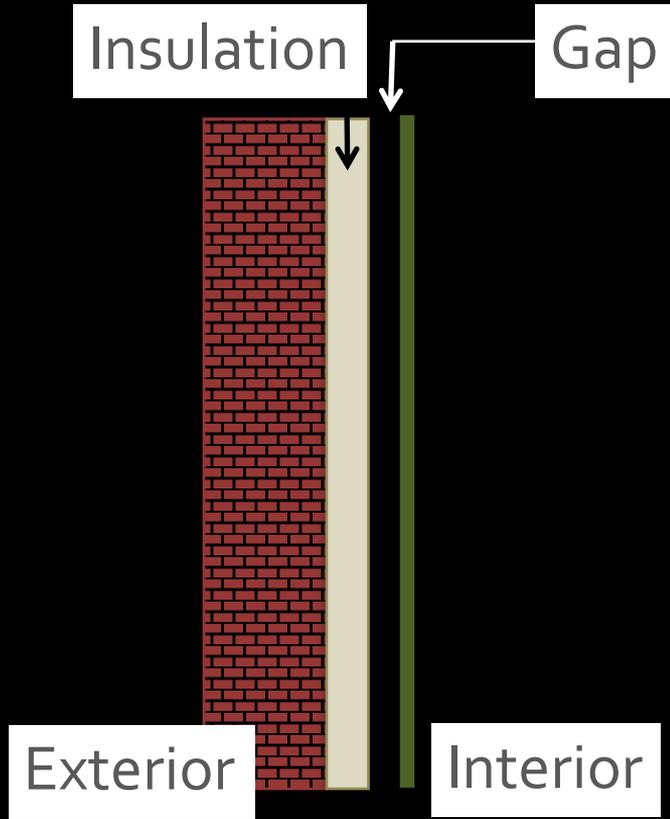
ASTM E84 does not correlate to improved fire safety:

- “Not a significant factor” in fire spread in wall cavities
- No correlation to:
 - Time to flashover
 - % of specimen destroyed in testing



Steiner Tunnel Test, or ASTM E84

Fire spread in a cavity is dependent on air flow



- In many cases, insulation is protected from ignition by a thermal barrier, such as gypsum board.
- ASTM E84 rating of insulation is not a determining factor of flame spread in a cavity.

Chlorinated Tris (TCPP)

(Tris (1-chloro-2-propyl) phosphate)

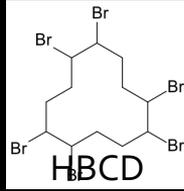
Polyurethane, Polyisocyanurate



- Accumulates in liver and kidneys
- Affects nervous system development
- Potential carcinogen
- 15-25% of the foam can be flame retardant

FR manufacture

Product manufacture



End of life

Recycling/ reuse;
combustion;
landfilling



Are we exposed to flame retardants from building insulation?

Demolition



In-use
(Dust & Air)



Installation



Safer alternatives

Mineral Wool



Expanded Cork



Cellulose - boards & spray-in



Aerogel Blankets

Alternatives Are Not Always Feasible



LIVING
BUILDING
CHALLENGE™

SPECIFIC EXCEPTIONS TO THE RED LIST

I10-E12 9/2010 HFRs in Foam Insulation

Foam insulation with HFRs are allowed in the following applications where space is limited and alternative products either cannot provide the required R-value performance and/or are required by code.

- Structural Insulated Panels (SIPS)
- Insulation in hollow metal doors
- Spray insulation for renovation projects
- Under slab insulation
- Roof and exterior insulation

Foam insulation in these cases must still meet all other Red List requirements.

Foam insulation is not allowed in cavity-fill applications where many alternative Red List-compliant options are on the market without HFRs.

Updated Codes

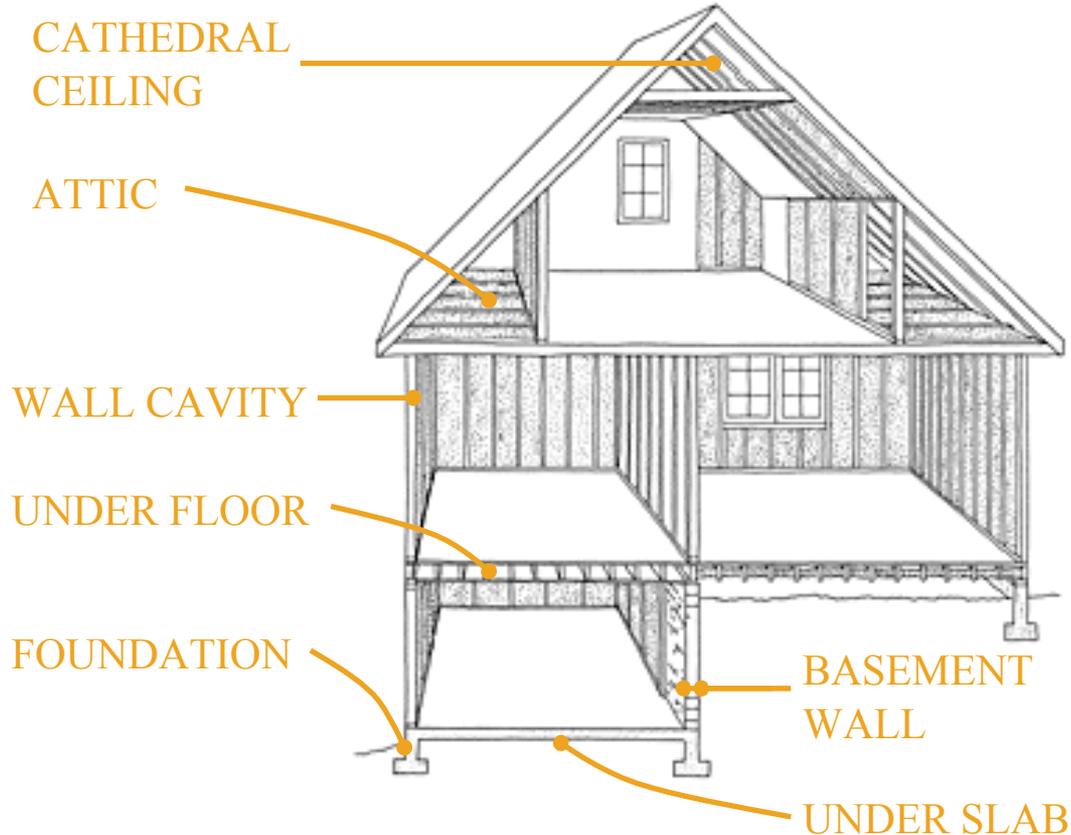
Sweden (2001) and Norway (2004) updated building codes to allow use of foam plastic insulation without flame retardants.

97% of XPS and EPS in Sweden and Norway is flame retardant free

No accidental EPS fires in Norway since codes were updated



Should U.S. Codes Be Changed?



Flame retardants
not needed for
fire safety:

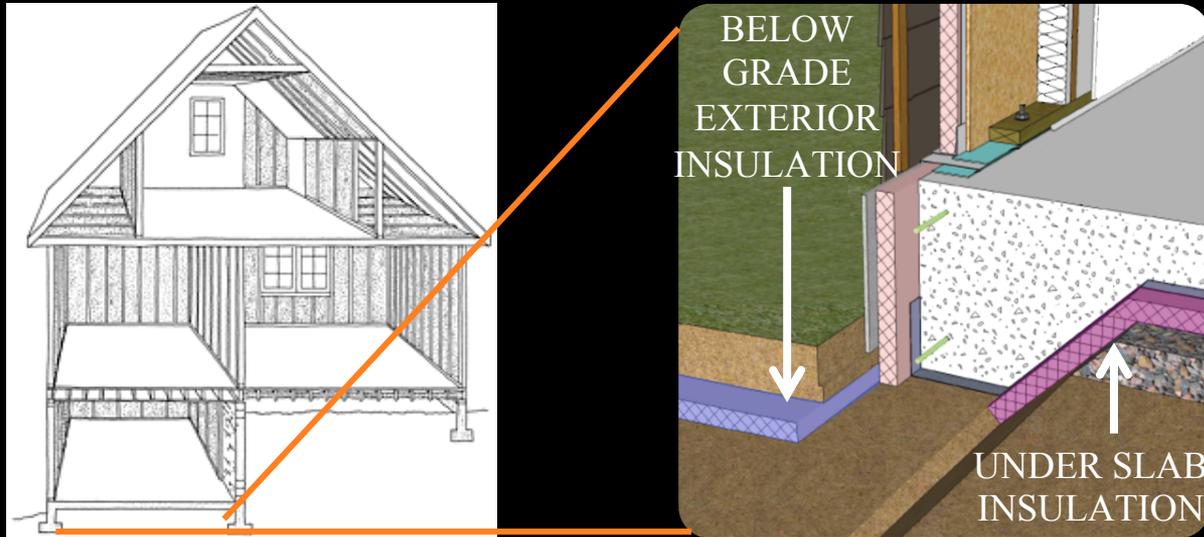
- Below grade
- Behind a thermal barrier

California Assembly Bill 127 (signed October, 2013):

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

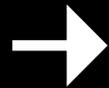
California Assembly Bill 127

- Implementation:
 - Working Group (ended summer 2015)
 - Identified below-grade use of insulation as “low-hanging fruit”



California Assembly Bill 127

- Implementation:
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Testing & analysis at Oklahoma State University

Oklahoma State University (OSU) Study: Overview

Commissioned by California OSFM following AB 127 Working Group.

Research Goals:

- Compare the burning characteristics of:
 - Polystyrene foam insulation with FRs
 - Polystyrene foam insulation without FRs
 - Combustible construction materials (e.g. ABS Pipe, Timber)
- Make recommendations on the use of foam plastic insulation without added flame retardants installed below-grade.



OSU Study: Insulated Foundation Testing

Scenario:

- Tested exterior below-grade foundation insulation to simulate worst-case soil erosion condition.
- Insulation was exposed to air, ventilation, and an ignition source (Class A burning brand).

Results:

- Foam plastic insulation without FRs installed below-grade poses no risk of flame spread to the structure. (pg.38)

OSU Study: Simulated Worksite Storage Testing

Scenario:

Small-scale (16" cube) stacks of combustible construction materials (e.g. ABS pipe and Timber) were ignited to assess time to ignition, peak heat release rate & fire risk on a construction site.

Results:

- ABS pipe had the highest fire risk of the all of materials tested (pgs. 20&38)
- Insulation with FRs has a similar peak heat release rate to insulation without FRs. (pgs. 20&38)
- When burned, insulation with FRs produces denser smoke than insulation without FRs. (pg.22)

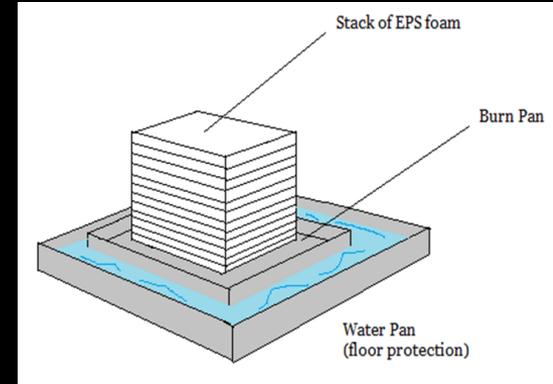


Figure 7 Bulk Storage Test Configuration

Oklahoma State University Study: Summary

Commissioned by California OSFM following AB 127 Working Group.

Key Findings

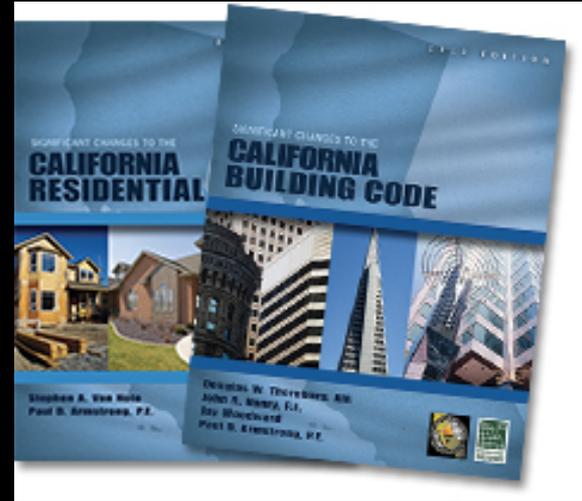
- Comparable ignition and heat release rates between foam plastic insulation with and without flame retardants and other combustible construction materials .
- When installed below grade, no risk of fire spread to the structure from insulation without flame retardants.

California codes can be safely updated to allow below-grade use of insulation without flame retardants.

OSU Study: Code Change Recommendations

The researchers proposed language to amend the California Residential Code (CRC) and California Building Code (CBC):

- The language calls out locations where it is **safe** to use foam plastic insulation without flame retardants.
- Exempts insulation in those locations from meeting standards which lead to the need for added flame retardants.
 - Surface burning characteristics (ASTM E84)
 - Limited Oxygen Index (ASTM C578)



OSU Study: Code Change Recommendations (cont'd)

To avoid misuse or confusion, insulation without FRs must be labeled on each face in **red lettering** with all of the following:

- **WARNING- FIRE HAZARD**
- This product is required to be installed **HORIZONTALLY** according to any of the following:
 - Below at least 12 inches of soil
 - Protected by a 3.5 inch concrete slab
 - Protected by another approved barrier per ASCE 32 Section 4.1.4 or CRC Section R506.1
- **NOT FOR VERTICAL OR ANY ABOVE GRADE APPLICATIONS**
- This product contains **NO** flame retardants
- Not tested for flame spread or smoke development requirements of the model building codes
- [ASTM material Type, "except Oxygen Index is less than 24%"]
- [Compressive resistance]
- [Manufacturer]

OSU Study: Code Change Recommendations (cont'd)

To ensure that the suggested amendments to the code were compatible, changes were made to other codes including:

- California Energy Code (CEC)
- California Code of Regulations (CCR)
- California Fire Code (CFC)
- California Bureau of Electronic & Appliance Repair, Home Furnishing and Thermal Insulation (BEARHFTI)

California Building Standards Commission (CBSC)

2018 Code Adoption Timeline



SUPPORTERS OF SAFER INSULATION



SIEGEL & STRAIN Architects



SF Environment

Google



LAKE | FLATO



SKANSKA

ARUP



FX FOWLE



orcutt | winslow



ZGF
BRUNNEN GANGLER FRASCA ARCHITECTS LLP

McLENNAN
MDESIGN



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CANNONDESIGN

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Fire Science and Technology Inc.

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BLUEGREEN
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Page/



YOST GRUBE HALL
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SEBESTA



GGLO
DESIGN



National Center for
Healthy Housing



TERRAPIN
BRIGHT GREEN

BuildingGreen

The Durst
Organization

hellmuth + bicknese
architects



hbn
HEALTHY BUILDING NETWORK

HKS

HR

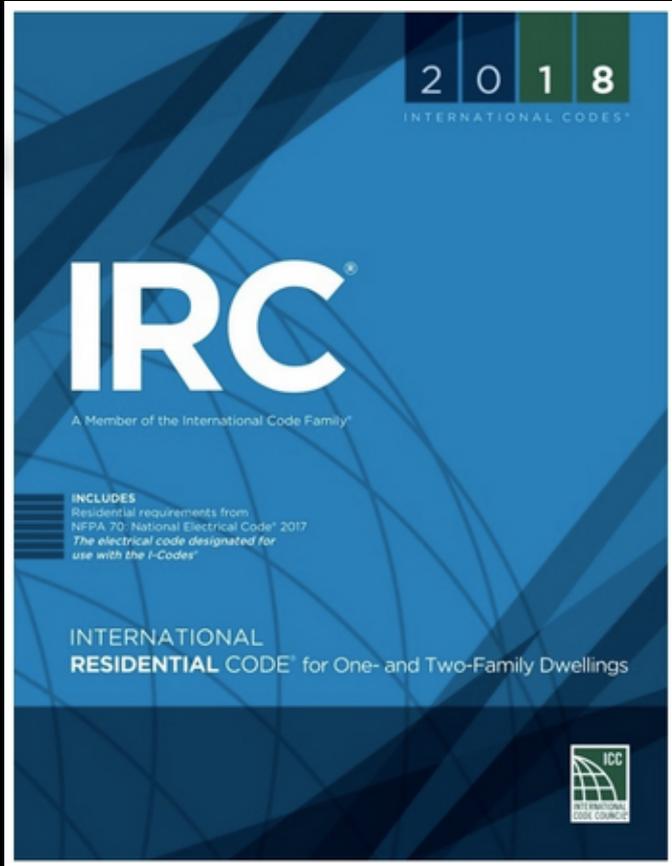
FAIR BUILDING TECHNOLOGY

STUDICE architecture pc



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Next Opportunity for Insulation Code change:



- 2021 International Residential Code will be updated in 2019
 - Proposals due Jan 2019
 - Committee Action Hearing: April 2019 in Albuquerque, NM
 - Public Comment Hearing: October 2019 in Clark County, NV

The 2019 International Codes Council Committee Action Hearings will be held in Albuquerque in April 2019.

We ask your help:

- Participate & support amendments to the 2021 IRC allowing for the safe below-grade use of flame retardant-free foam plastic insulation.
- Give us your input on the draft code change language.



Contact: Arlene@GreenSciencePolicy.org

We Need Your Help:

- Tell your colleagues and friends
- Send support letter(s) to Office of State Fire Marshal
- Review code proposals once published by the CA Building Standards Commission
- Provide supporting public comments to the Commission
- Other ideas welcome!

To get involved contact: Arlene@GreenSciencePolicy.org

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.

For monthly e-newsletters
www.GreenSciencePolicy.org

Questions:
Arlene@GreenSciencePolicy.org

Acknowledgements

Thanks to our Safer Insulation Solutions team: David Rich, Vyto Babrauskas, Don Lucas, Marjorie Smith, David Eisenberg, Martin Hammer and Suzanne Drake.



GreenSciencePolicy.org/healthy-insulation