Naptime Nightmares? Toxic Flame Retardants in Child Care Nap Mats

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Summary

Nap time should be a healthy, peaceful and restful time for children in child care. Yet, this report shows that children sleep on foam nap mats containing toxic flame retardant chemicals during what should be dream-filled napping.

This toxic exposure occurs because chemical flame retardants are frequently added to foam. At first glance, this concept can seem to make some sense - foam burns easily. However, the concept does not translate to reality. In fact, government studies have shown that flame retardants in foam-containing products do not improve fire safety as they are typically used.

In addition, many chemical flame retardants are toxic. Some have been linked to serious health problems like cancer, obesity, and allergies. There is little publicly available information about the safety of others.

Flame retardants used in everyday products, including nap mats, are typically secrets – the chemicals used to treat foam are not identified on product labels or elsewhere.

We found that 22 out of the 24 foam-containing nap mats we tested had been treated with at least one chemical flame retardant. Nineteen of our 24 nap mats had been treated with two or more flame retardant chemicals. Nine of the mats contain chlorinated Tris, a cancer-causing chemical that was removed from children's pajamas more than 30 years ago because it caused genetic damage.

Flame retardant chemicals in nap mats escape into the air wherever they are used or stored. Children (and their teachers) breathe in these chemicals while they nap and while they play or work in rooms where nap mats are kept.

Children should not be exposed to unnecessary toxic chemicals anytime, but especially while they nap. We recommend that parents and child care providers choose nap mats that are not made with foam. We also encourage parents, teachers, and others to demand that regulatory agencies and elected officials protect all of us from exposure to toxic chemicals.

What We Did

Organizations from across the country – Center for Environmental Health (California and New York), Alaska Community Action on Toxics, Clean Water Action Connecticut, Clean Water Action Massachusetts, Clean and Healthy New York, Vermont Public Interest Research Group, and Washington Toxics Coalition – contributed nap mats to this project. We purchased 21 nap mats containing polyurethane foam from major retailers and child care supply companies in October and November 2012. Most of the purchases were made online. In addition we obtained three nap mats from child care centers.

We sent foam samples from each of the 24 nap mats to Dr. Heather Stapleton (Nicholas School of the Environment, Duke University) for independent analysis. The samples were identified only by a code, so that the lab did not know which products were being tested. Her lab analyzed the foam from each nap mat for flame retardants using mass spectrometry. Details of the analytical methods Dr. Stapleton used are described in Environmental Science and Technology 45: 5323–5331, available online at http://pubs.acs.org/doi/pdf/10.1021/es2007462.

What We Found

Our tests identified 10 flame retardant chemicals in our nap mats. Four of these are commonly used as a mixture often called Firemaster 550. Three of them are commonly used as a mixture we call the "Tert-butyl mixture."

All but two of the 24 nap mats were made from foam treated with flame retardants, and all but five of the 24 mats contained at least two flame retardant chemicals or mixtures.

The most common flame retardant was triphenyl phosphate (TPP), in 18 nap mats. We found chlorinated Tris (TDCPP) in nine mats. Eight mats contained a mixture equivalent to Firemaster 550, and eight contained the "Tert-butyl mixture."

For complete results about each of the nap mats we tested, see "Detailed Results" at the end of this report.

Flame Retardants
Not Effective in Nap Mats

Flame retardants are chemicals added to polyurethane foam to make it less likely that the foam will burn if it's in contact with the flame from a match or a candle. However, in nap mats (and most other uses of foam) the foam is covered by fabric and would not be directly in contact with flames until the fabric has burned away. That kind of a fire is so big that the retardants are ineffective.

Government studies and fire experts have found that flame retardants are ineffective as they are used in furniture and products like nap mats.

Here's what the Consumer Product Safety Commission (CPSC) wrote in 2012 after conducting a series of experiments with upholstered furniture:

"...the fire-retardant foams did not offer a practically significantly greater level of open-flame safety than did the untreated foams."

Here's what fire safety scientist Vytenis Babrauskas wrote in 1983 after a series of experiments with furniture:

"Furniture using polyurethane foams with retardants added to meet California state requirements did not show any reduction in the rate of heat release compared to ordinary polyurethane foams."

Smoke detectors add to our fire safety – deaths from home fires are half as common now as they were before smoke detectors were common. Foam treated with flame retardants, in most situations, does not.

Flame Retardants

Not Good for Children (or for the Adults Who Care for Them)

The flame retardants used in nap mats are a diverse group of chemicals that cause a wide array of health problems. Cancer, obesity, reduced fertility, hormone disruption, and allergies are just a few of the problems that have been linked to exposure to these flame retardants. And this list is likely to be incomplete. None of the chemicals used as flame retardants have been comprehensively tested and there are large gaps in our knowledge about the toxicity of these chemicals.

Particularly concerning is the ability of these chemicals to disrupt the normal functions of our hormones. Hormones are chemical messengers that work together in a system that "regulates all biological processes in the body from conception through adulthood and into old age." Hormones are potent in tiny amounts, and research over the last several decades has shown, similarly, that "low-dose effects are remarkably common" in studies of hormone-disrupting chemicals.

We found ten flame retardant chemicals in our nap mats. Four of these chemicals are used in the mixture commonly sold as Firemaster 550; three others are used in a mixture we call the "Tert-butyl mixture." (See the next page for the names of the chemicals used in those two mixtures.) Details about health hazards associated with the flame retardants we found include the following:

- TCPP (tris (1-chloroisopropyl) phosphate) caused genetic damage in studies of human cells. In tests with laboratory animals, TCPP changed the length of the menstrual cycle.

- TDCPP (chlorinated Tris; tris- (1,3-dichloroisopropyl) phosphate) is identified as a cancer-causing chemical by the state of California and the National Research Council. In laboratory animals it is toxic to developing embryos and also causes genetic damage in studies of human cells. It also disrupted the development of cells that are part of the nervous system. In men attending infertility clinics, exposure to TDCPP was linked with

changes in hormone levels.

- **TPP** (triphenyl phosphate) damaged the nervous system in studies of laboratory animals. It also has caused skin allergies. In men at infertility clinics, TPP exposure is linked with lower sperm production.

- **Firemaster 550** (and other retardants made with the same four chemicals: isopropyl phenyl diphenyl phosphate, di (isopropyl phenyl) phenyl phosphate, tetrabromobenzoate, and tetrabromodiethylhexyl phthalate) caused obesity and disrupted normal hormone function in tests with laboratory animals.

- **Tert-butyl mixture** (4-(tert-butyl)phenyl diphenyl phosphate (2), bis(4-(tert-butyl)phenyl) phenyl phosphate (3), and tris(4- (tert-butyl)phenyl phosphate) has very little toxicological information. At least one of the chemicals in the mixture affects the liver.

Flame Retardant Regulations

Many nap mats - 18 of the 24 mats we tested - are sold with tags indicating that they comply with TB117 (the California Bureau of Electronic and Appliance Repair, Home Furnishings, and Thermal Insulation Technical Bulletin 117) and its associated regulations. However, according to state regulators, nap mats are not actually subject to the requirements of TB117.

For the past four decades, TB117 has resulted in the addition of unnecessary chemical flame retardants to a variety of foam-containing products. Earlier this month, the state of California released a proposed update for TB117 (TB-117 2013) that would create real fire safety benefits without the use of harmful flame retardant chemicals.

For information about the new update of TB117, see http://www.bhfti.ca.gov/about/laws/propregs.shtml.

Nine of the nap mats we tested contain chlorinated Tris (TDCPP). In California, products that can expose consumers to chlorinated Tris, which is known to the state to cause cancer, must be labeled as such. None of the mats were labeled in this way.

Last fall, the Center for Environmental Health tested nap mat foam for TDCPP at Paradigm Environmental Services (Rochester NY) and initiated legal action against suppliers of nap mats for their failure to comply with state consumer protection law. CEH filed lawsuits alleging violation of California consumer protection law against 8 nap mat suppliers on February 15, 2013.

Exposure to Flame Retardants in Nap Mats

Flame retardant chemicals in nap mats escape into the air wherever they are used or stored. Children breathe this air while they nap, and also if they play in areas where the nap mats are stored.

Some of the evaporated flame retardants will settle on children's skin, and be absorbed through their skin.

In addition, some of the evaporated flame retardants settle on dust particles. Children ingest this dust when it gets on their fingers and they put their fingers in their mouths.

Teachers in child care centers are exposed to flame retardants in similar ways.

A recent study sponsored by the California Air Resources Board found TDCPP and Firemaster 550 chemicals in dust samples from every child care facility studied (40). Concentrations of TDCPP were higher in facilities that used foam nap mats than in facilities that did not.

Detailed Results

Description	Brand	Store	State	TCPP	TDCPP	TPP	Fire-master 500 or equivalent product	Tert-butyl mixture
Yellow Rainbow Rest Mat	No brand	Lakeshorelearning.com	CA		X	X		X
Red/Green Pillow Folding Rest Mat	The Children's Factory	Lakeshorelearning.com	CA			X	X	
Blue/Red Indestructible Folding Mat	The Children's Factory	Lakeshorelearning.com	CA		X	X		X
Blue/Green Hygenic Folding Mat	The Children's Factory	Lakeshorelearning.com	CA			X	2 of 4 chemicals in mixture	X
Blue Kindermat Deluxe	Peerless Plastics	Schoolspecialty.com	CA		X	X		X
Blue Nap Mat	Colgate		NY			X	X	
Rest Assured Nap Mat by Anthony Williams	Marlo Plastics Products	Toys R Us	VT			X	X	
Blue/Teal Heat Sealed 4-Fold Nap Mat	The Children's Factory	Lakeshorelearning.com	WA		X	X	2 of 4 chemicals in mixture	X
3-Section Blue Mat	Mahar Manufacturing	Busykids.com	CA			X	2 of 4 chemicals in mixture	X
Green Rest Assured Nap Mat by Anthony Williams	Marlo Plastics Products	Northshorecare.com	CA			X	X	
Microban Nap Mat	Safety 1st	Amazon.com	CA	X	X			

Description	Brand	Store	State	TCPP	TDCPP	TPP	Fire-master 500 or equivalent product	Tert-butyl mixture
Red/Blue 3-Section Infection Control Mat	The Children's Factory	Busykids.com	CA			X	2 of 4 chemicals in mixture	X
Yellow Rest Mat	Wesco	Kaplanco.com	CA			X	X	
Green Deluxe Flat Rest Mat	Grantco MFG	USMarkerboard.com	CA			X	X	
Red/Blue Economy Flat Rest Mat	Grantco MFG	USMarkerboard.com	CA			X	X	
Red/Blue 3-Section Infection Control Mat	The Children's Factory	Kaplanco.com	CA			X	X	
Microban Nap Mat	Safety 1st		AK	X	X			
KinderMat	Peerless Plastics		AK			X	3 of 4 chemicals in mixture	
Daydreamer Blue/Green Nap Mat	Peerless Plastics	Barclay School Supplies	NY		X	X		X
2" Germ-free Rest Mat	Angeles		CT	X				
Children's Blue Rest Mat	Peerless Plastics	Target	MA		X			
Children's Blue Rest Mat	Peerless Plastics	Target.com	CA		X			
Blue Rest Mat	Wesco	Sears.com	CA					
Deluxe Memory Foam Nap Mat	Aquatopia	Babies R Us	WA					

What You Can Do

Parents:

- Purchase nap mats made without polyurethane foam. Options that are not usually treated with flame retardants are polyester fiberfill, cotton, and wool.
- Ask nap mat suppliers about their use of flame retardant chemicals, and purchase products from companies that pledge they no longer use any of these chemicals. CEH is pursuing legally binding agreements to eliminate flame retardants with several leading nap mat suppliers.
- Ask your child care provider to purchase mats made without polyurethane foam or to purchase mats from companies who have agreed not to use flame retardants.
- Wash your hands and your children's hands often, especially before eating.

Child Care Providers:

- Purchase nap mats made without polyurethane foam. Options that are not usually treated with flame retardants are polyester fiberfill, cotton, and wool.
- Ask nap mat suppliers about their use of flame retardant chemicals, and purchase products from companies that pledge they no longer use any of these chemicals. CEH is pursuing legally binding agreements to eliminate flame retardants with several leading nap mat suppliers.
- Ask your child care supply store to sell mats made without polyurethane foam or to sell mats from companies that have agreed not to use flame retardants.
- Children and teachers should wash their hands often.
- Vacuum or wet mop nap areas often. Use a HEPA vacuum cleaner if available.
- Open windows as much as possible.

Everyone:

- Support state efforts to provide toxic-free fire safety (See details on the next page.) Take action to support flame retardant free furniture and baby products: http://bit.ly/YkZkT4.
- Support efforts to fix our nation's outdated and ineffective chemical policy regulations.

Pending State Actions

California:

- Technical Bulletin 117-2013 (TB 117-2013)
  Draft standard would revise California's outdated and ineffective flammability standard for furniture and baby products which has become a de facto national requirement. The draft standard would provide greater fire safety without the use of toxic flame retardants throughout the United States and Canada. Take action at http://bit.ly/YkZkT4. Contact Judy Levin at the Center for Environmental Health for more information: judy@ceh.org

- California: AB 127
  Does not ban flame retardants in building insulation, but notes their toxicity, and states the legislature's intention of reducing their use in plastic foam building insulation. For more information, go to http://www.changecalifornia.org/ or contact Kathryn Alcántar at the Center for Environmental Health: Kathryn@ceh.org

Connecticut: HB 6332
Bans sale of any product containing Chlorinated Tris flame retardants (TDCPP (also called TDCP), TCEP or TCPP) marketed for the use of children three years of age or younger. For more information, go to http://www.safehealthyct.org/ or contact Anne Hulick at Clean Water Action-CT: ahulick@cleanwater.org

Maine: Introduced, no bill number yet
Directs the Department of Environmental Protection to add the flame retardant Chlorinated Tris (TDCPP) to the list of chemicals of concern, and the list of chemicals of high concern. For more information, go to http://www.preventharm.org or contact Steve Taylor at Environmental Health Strategy Center: stevetaylor@preventharm.org

Maryland: HB 99
Prohibits the sale of specified child care products (toys, car seats, nursing pillows, strollers) that contain Chlorinated Tris (TCEP). For more information, go to http://www.marylandpirg.org/issues/mdp/healthy-kids-healthy-

maryland or contact Jenny Levin at Maryland PIRG: jlevin@marylandpirg.org

Massachusetts:

- SD 1618
  Bans the sale of children's products and residential upholstered furniture containing Chlorinated Tris (TDCPP, TCEP, TCPP), and any product containing PBDEs (DecaBDE, OctaBDE, and PentaBDE) and provides that replacement chemicals not be chemicals of high concern. For more information contact: Elizabeth Saunders at Clean Water Action-MA: esaunders@cleanwater.org
- An Act for Healthy Families and Businesses (no bill number yet)
  Sponsors: Rep. Kaufman and Sen. Donnelly
  Creates a comprehensive yet flexible program to support businesses to transition away from using and selling products containing toxic chemicals that harm the health of children or adults and replacing them with safer alternatives. For more information: http://www.healthytomorrow.org/2013/01/healthy-families-and-businesses.html or contact: Elizabeth Saunders at Clean Water Action-MA: esaunders@cleanwater.org

New York SO3703/AO4741
Expands the Tris-free children's and baby act by expanding the definition of "Tris" to include TDCPP in children's products. For more information contact Kathy Curtis at Clean and Healthy New York clean.kathy@gmail.com.

Vermont: S 81/H 241
Bans the sale of certain consumer products containing PBDEs (octaBDE, pentaBDE, and decaBDE), and bans the sale of residential furniture or children's products containing Tris (TDCPP, TCEP, and TCPP). For more information, go to http://www.vpirg.org/ or contact Lauren Hierl at Vermont PIRG: lhierl@vpirg.org

Washington: HB 1294/SB 5181
Bans the use of Chlorinated Tris (TDCPP, TCEP), and any other chemical that has been identified as a high priority chemical of high concern for children, in children's products and residential upholstered furniture. For more information go to http://watoxics.org/chemicals-of-concern or contact Ivy Sager-

Rosenthal at Washington Toxics Coalition:
isagerrosenthal@watoxics.org

The following legislatures do not have pending flame retardant legislation yet, but intend to do so in the 2013 session.

Alaska:
Contact: Alaska Community Action on Toxics
Pamela Miller at: pamela@akaction.org

Illinois:
Contact: Illinois PIRG
Hailey Gold at: hwitt@illinoispirg.org

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