Polyurethane Foam Association

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February 26, 2010

Rebecca Williams
Michigan Public Radio
535 W. William
Suite 110
Ann Arbor, MI 48103

Dear Rebecca:

Thank you for your inquiry and questions.

Polyurethane Foam Association (PFA) manufacturing members are dedicated to manufacturing "comfort." In the case of flexible polyurethane foam (FPF), comfort is both a physical characteristic and a state of mind. The safety of workers, the communities PFA members work within, and the consumer public are the top priority.

We try to be very responsive to media and I appreciate your interest in flexible polyurethane foam (FPF). As my hoarse voice indicates, I have been waylaid with a respiratory cold/virus. So, with respect for your audience, I hope that this written statement will provide sufficient information for your report.

I have responded to the questions where we have expertise and will defer to others who should be able to respond to questions that require professional knowledge in toxicology and application risk. In those areas, PFA is not the right resource to provide answers to your questions related to flame retardants. I would encourage you to speak directly to the American Chemistry Council and to flame retardant suppliers. Meanwhile, I will share what I can with you.

As the trade association of the flexible polyurethane foam industry, we don't have specifics about the exact flame retardant (FR) products now in use since FR selection is part of individual foam-producing member proprietary formulations. Some foam formulations may use "off the shelf" FR products and other formulations may require proprietary combinations of FR additives. FR products are supplied by companies such as ICL-IP America, Chemtura and Albemarle. In general, as you are probably aware, the current flame retardants used by US foam producers include combustion modifying additives that could generally be described as chlorinated phosphates, phosphate esters, melamine blends, and proprietary brominated compounds. None of these products are PBDEs.

However, in the US, it is also important to establish that not all flexible polyurethane foam contains flame retardants. In fact, only a portion of flexible polyurethane foams contain FR additives and those FR products are used to meet specific combustion performance objectives.

FRs are added to some foams either to meet current California regulations related to furniture component flammability, or to meet specifications imposed by foam purchasers. From a residential product regulatory perspective, only California requires that all upholstered furniture filling materials (including polyurethane foam, latex, and various natural and synthetic fiberfills) meet a series of component tests that involve testing for both resistance to cigarette ignition and resistance to small open flame. A portion of California TB 117 requires that cellular filling materials such as polyurethane foam and latex foam rubber pass a 12-second small open flame exposure test. This requirement has been on the books in California since 1975. In order for a foam product to meet the small open flame requirement, combustion-modifying additives (fire retardants) are typically required.

On the other hand, in most cases, California TB117 cigarette ignition requirements for cellular filling materials can be met without the use of fire retardants. Flexible polyurethane foam performs well in this function.

The necessity for fire retardant additives does not extend to residential bedding products; not in California or anywhere in the United States. The federal CFR 1632 cigarette ignition requirement for mattresses does not require FR materials to be added to the foam. Likewise, the newer CFR 1633 open flame flammability standard for mattress sets does not require than foam products be combustion modified. The CFR 1633 open flame standard for mattress sets can be met using conventional filling products together with an ignition barrier technology applied beneath the mattress cover. Unfortunately, the same barrier technology used in mattress sets is not currently feasible in upholstered furniture.

As manufacturers of comfort products for use in home furnishings, it is important that PFA manufacturing members meet the expectations of end-product manufacturers, retailers, and consumers. Product safety is a key objective. Like all organic materials such as wood, cotton, wool, and latex foam rubber, flexible polyurethane foam will ignite and burn when exposed to a hot enough ignition source. As a result, PFA has been a long-time supporter of flammability standards for home furnishings products. In recent times, the safety of some of the technologies used to combustion modify flexible polyurethane foams and other cushion filling materials used in upholstered furniture has come into question. As a number of groups sought more information, so did PFA. In 2007, to allow time for additional research on the part of FR additive producers and regulatory groups, PFA recommended that the California Bureau of Home Furnishings and Thermal Insulation temporarily suspend the small open flame testing requirements contained in TB 117. The suggested hiatus was not provided and the continued use of fire retardants is still required to meet this California standard.

The PFA has been a major supporter of numerous fire safety initiatives since the Association was established in 1980, including early, continuing and strong support of fire-safe cigarettes legislation. We have an ongoing initiative called Proactive on Fire Prevention for members; we helped establish and fund the Fire Prevention Alliance; fund and provided leadership to the Residential Fire Sprinkler Institute; and we are partners with the United States Fire Administration on their public safety campaigns. We believe that the nationwide adoption of reduced ignition propensity cigarettes, along with use of smoke alarms and fire prevention education are the keys to reducing the number of household fires, related deaths and injuries

involving furniture and bedding. According to NFPA and CPSC statistics, ignition from smoking materials is by far the leading cause of household fires involving upholstered furniture (more than 80% of deaths and 60% of injuries). By comparison, a much smaller number of deaths and injuries result from upholstered furnishings fires caused by small open flame. Again, fire retardant additives are not required to achieve smolder ignition resistance.

Related to environmental issues, PFA manufacturing members have a superb record and members are proud of their compliance records. In fact, in a number of cases, PFA members have voluntarily found ways to reach compliance long before it has been required by governmental agencies.

Our members eliminated use of CFCs in the early 1990s, well ahead of the Montreal protocol deadline. We pioneered solutions to meet NESHAP standards related to use of methylene chloride and other substances. The use of PBDEs in the manufacture of FPF was voluntarily eliminated by U.S. foam producers in 2005, in advance of individual state restrictions.

A number of years ago, we became aware of the importance of building confidence in products containing flexible polyurethane foam at the consumer level; not, just regarding possible fire retardant content, but also to address questions about the overall integrity of polyurethane foam including environmental, toxicological and indoor air quality. PFA worked with European interests and an advisory panel made up of stakeholders including academia and NGOs to develop a rigorous, third-party test and product certification program that could be voluntarily applied to polyurethane foam products manufactured anywhere in the world.

I hope that someday you'll report on the CertiPUR-US program. This industry initiative was launched in May 2008 and is now managed under the Alliance for Flexible Polyurethane Foam, Inc. It is quickly gaining momentum. CertiPUR-US certified foams are made without ozone depleters, methylene chloride, PBDEs, or problematic heavy metals, formaldehyde or prohibited phthalates, and are low emission (low VOCs) for indoor air quality.

CertiPUR-US addresses the issue of possible fire retardant content in a scientifically responsible way. As have a number of European environmental label programs, the application for a CertiPUR label in Europe and in the United States prohibits the use of components that fall into certain European Risk Phrases of Concern. More information is available at www.certipur.us.

PFA manufacturing members also look to federally required MSDS information, the EPA, NIH, and the European REACH Risk Assessment Reports for health and safety guidance regarding the use of all raw materials used in the manufacture of flexible polyurethane foam products.

We are not aware of information from any regulatory agency that would place any of the current fire retardant chemicals used by United States foam manufacturers into any of the prohibited Risk Phrase categories. Upon additional regulatory review, should such cautionary classifications be assigned, then those chemicals would no longer be acceptable for use within the voluntary CertiPUR certification programs.

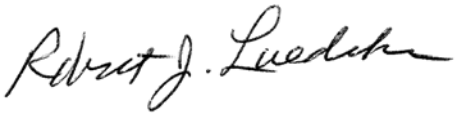
A great deal of the work I do with media relates to correcting misinformation, so I appreciate your seeking out the facts.

I have also attached for review three PFA documents:

- FPF Industry at a Glance
- Adapting to Environmental Progress
- PFA Platform on Sustainability

I trust that our response answers many of your questions. For additional information, you may wish to contact the American Chemistry Council and appropriate fire retardant chemical manufacturers.

Sincerely,



Robert J. Luedeka
Executive Director

Flexible Polyurethane Foam: Industry at a Glance

Furniture, Bedding, Carpet Cushion, Automotive, Packaging

Polyurethane Foam Association

Used in hundreds of consumer products to provide comfort, support, safety and durability, flexible polyurethane foam (FPF) is one of the most versatile materials ever created.

FPF is widely used for its qualities: it is light weight, resilient, quiet, low odor and resistant to mildew and other triggers of common allergies. FPF may also be molded and cut.

FPF is all around us in our daily lives, in our homes, vehicles, schools and businesses. It is the cushioning material of choice in nearly all upholstered furniture and mattresses. Underfoot, it is used as carpet cushion. FPF is the material used for car and truck seats, headrests, armrests, roof liners and soundproofing. In medical settings, FPF provides adaptable support as needed. As packaging material, it protects delicate objects and helps the flow of ink in our printer cartridges. More than 1.2 billion pounds of foam are produced and used every year in the U.S.

How Is FPF Manufactured?

Flexible polyurethane foam is manufactured as a product of the reaction of two key raw materials, a polyol and a diisocyanate with water. When the raw materials are combined, the reaction forms bubbles and the mixture expands, like bread rising. In a matter of minutes, the reaction is complete and the raw materials are converted to a usable product.

Two Production Processes

Slabstock: This method is used to produce most foam for furniture cushioning, carpet cushion and bedding. The mix is poured onto a moving conveyor with sides from 3'-4' high, where it reacts and expands into a slab. The continuous slab is then cut, stored, and allowed to cure for up to 24 hours, and then undergoes fabrication into useful shapes for a wide range of applications.

Molding: Used in the United States primarily for automotive cushioning and office furniture, this process produces individual items by pouring the foam mixture into shaped molds where the foam reaction take places within the enclosure.

FPF and Fire Safety

An organic material, like wool, cotton, nylon and polyester, FPF is flammable. It should be kept away from open flames and heat sources such as burning cigarettes, lighters, matches, space heaters or any other potential ignition source, because if ignited, FPF can burn rapidly.

Since the 1960s, PFA members have been researching and improving the combustion characteristics of FPF cushion components to help reduce the ignition and combustion properties of furniture. However, even with the addition of fire retardant additives, there is no way to protect a sofa or chair completely from accidental or deliberate ignition. The PFA has long supported fire prevention and safety education and participated in the development of flammability standards. In addition, the PFA is an active partner with the Coalition for Fire-Safe Cigarettes, the Fire Prevention Alliance, the Residential Fire Safety Institute and the U.S. Fire Administration.

In February 2006, the U.S. Consumer Product Safety Commission (CPSC) approved a new standard that set mandatory national fire performance criteria for all mattresses. The PFA actively supported the new standard and worked with the CPSC, the International Sleep Products Association (ISPA), the Sleep Products Safety Council (SPSC) and other industry groups in its development. On July 1, 2007, the new Federal Open-Flame Mattress Standard (16 CFR Part 1633) took effect. The PFA's proactive research and responsibility continues, supporting the efforts of upholstered furniture and mattress producers to reduce the incidence of fire. In addition, the PFA plays a key role by educating regulators, fire officials, furniture and mattress manufacturers, home furnishings retailers and consumers about the safe handling and use of FPF.

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FPF Environmental Safety and Regulatory Compliance

The process used to manufacture flexible polyurethane foam is sophisticated and designed to be environmentally safe. While numerous raw materials are used in the manufacture of FPF products, when handled using standard industrial procedures, they pose no danger to their surroundings. Any trace emissions from the process are either collected in carbon scrubbing equipment or exhausted from specially constructed stacks.

The manufacture of FPF is closely regulated for environmental and health safety at local, state and federal levels. In all processes and operations, manufacturers meet demanding emissions and workplace safety requirements.

The members of PFA make compliance with government and industry standards a priority, and are proud of their track record of promoting effective environmental, health and safety practices for the benefit of industry workers and surrounding communities. In fact, the FPF industry phased out all use of ozone-depleting CFCs well before the deadline set by the Montreal Protocol. PFA members are addressing the need for green products and new formulations that may reduce some of the country's petroleum dependence.

FPF and Recycling

FPF is increasingly being used in green buildings because it has so many environmentally friendly properties including recyclability. In fact, FPF scrap collection and reuse has developed into one of the most successful examples of recycling in the world.

As pioneers in recycling programs, FPF manufacturers first attacked the problem of FPF waste by using more efficient manufacturing processes to minimize the amount of process scrap. Even so, up to 30% of all FPF can become scrap after product fabrication. Instead of being dumped into landfills, FPF scrap and recovered materials are easily recycled into useful consumer products such as bonded carpet cushion, which accounts for approximately 80% of all carpet cushion products sold in the U.S.

Today, FPF scrap supplies needed raw materials and also generates additional revenue sources. With the development of practical end-uses for scrap flexible polyurethane foam, almost every piece of process scrap is recyclable.

FPF Industry Resources Available from the PFA

On the PFA web site at www.pfa.org, you'll find literature including "InTouch," a newsletter providing in-depth, technical information on the performance of FPF in consumer and industrial products, and on all aspects of the FPF industry.

Visit the PFA Hall of Fame, where industry innovators and leaders are honored for their contributions to the development and enhancement of FPF technologies and products.

Other resources include a glossary of FPF industry terms, links to the PFA's partner organizations, and abstracts of the scientific research which are the basis for the PFA's responsible role in the industry.

About the Polyurethane Foam Association

The Polyurethane Foam Association (PFA) is the trade association of U.S. flexible polyurethane foam (FPF) manufacturers and their suppliers. PFA is focused on the education of foam users and allied industries, addressing technology, safety and the responsible environmental and health record of FPF.

The PFA was formed to find and achieve successful solutions to important issues of flammability and fire safety. Together, the members of PFA account for approximately 70% of all domestic FPF production.

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Adapting to Environmental Progress:

The Flexible Polyurethane Foam Industry's Record of Innovation and Success

Polyurethane Foam Association

For decades, flexible polyurethane foam (FPF) manufacturers, represented by the Polyurethane Foam Association (PFA), have worked closely and responsibly with regulatory agencies and environmental groups to ensure public health and safety.

PFA Manufacturing Members Are Technological Innovators

With an impressive history of technological transformation to adapt to new conditions, the PFA manufacturers have consistently risen to meet the challenges posed by advancing scientific knowledge and environmental policies.

Innovation takes time

With every new challenge, PFA manufacturers have found successful ways to modify FPF manufacturing processes, equipment and raw materials to comply with – and often exceed – stringent new standards.

Most changes in FPF manufacturing involve significant investment in research and/or mechanical modifications during the conversion process.

Technological solutions are not always apparent and may require perseverance and an adequate amount of time for research, laboratory and full-production trials, and continuous physical testing.

Many changes in raw material selection or manufacturing technology actuate more changes down the line in the precisely balanced FPF manufacturing process.

Even when an immediate solution is not available, PFA members have demonstrated that they are innovative problem solvers who, over time, are able to get the job done.

CASE STUDY #1: Industry Pioneered Solutions to Meet New NESHAP Standards

In 1998, the Environmental Protection Agency issued the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulation aimed at reducing air pollutant emissions, with a focus on reducing emissions of methylene chloride, a raw material, then used throughout the U.S. by the FPF manufacturing industry as an auxiliary blowing agent to cool foam and assist in the foam-blowing reaction.

The FPF industry came up with several solutions that were developed and used in various forms by PFA foam manufacturing members:

- Liquid CO_2 processing using recycled industrial CO_2
- Rapid cooling
- Acetone-blown foaming process (provides for reduction of ABAs in some formulations)
- Variable pressure foaming technology – a major change in mechanical processing
- Specialty modifiers

By the time of NESHAP's October 1998 implementation, PFA manufacturers had already eliminated and replaced more than 90 percent of the methylene chloride used in FPF manufacturing. Today, the U.S. foam industry has completely eliminated the use of methylene chloride, as well as CFCs (see Case Study #2 on reverse).

More than 1.7 billion pounds of flexible polyurethane foam are produced every year in the U.S. and used to provide comfort, support, and durability in hundreds of consumer products. The processes used to manufacture the foam, regulated at the national, state and local levels, are sophisticated and designed to be environmentally safe.

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CASE STUDY #2: Triumph over CFCs

The Montreal Protocol, which was adopted in 1987, mandated that industries eliminate chlorofluorocarbons (CFCs) from manufacturing processes by the year 2000. U.S. producers of FPF began at once to seek alternatives to CFCs. The FPF industry's preemptive actions resulted in dramatic reductions of CFCs.

FPF industry research developed four effective primary alternative methods and agents:

- Methylene chloride (no longer in use today)
- Chemical additives
- Forced cooling
- Liquid carbon dioxide (CO_2) systems

By 1992, well ahead of the required schedule, PFA members, representing the majority of the FPF industry, had achieved a 98 percent reduction of CFCs without any disruption in supply or compromise of product quality by initiating the use of alternative foam chemistries and mechanical equipment.

A PFA-drafted document was the basis for a handbook on removing CFCs and adapting manufacturing processes. This handbook was distributed worldwide.

CASE STUDY #3: PBDEs Eliminated from FPF Manufacturing

In January 2005, PFA manufacturer members reported they had almost completely phased out the use of pentabrominated diphenyl ether-based (PentaBDE) flame retardants in the manufacturing of foam grades for use in home furnishings cushioning applications.

Working together with raw materials suppliers, FPF manufacturers were able to reformulate using substitute FR materials. The process required almost two years of conversion work. Not all grades of non-PentaBDE foam could be reproduced using a single FR additive. Some grades required blending of multiple raw materials and mechanical adjustments in foam processing technology. Conversion from use of PentaBDE required a complete reformulation of entire combustion-modified product lines. It was an extremely challenging task, consuming thousands of hours and untold financial resources. Conversion away from PentaBDE by the foam industry is now complete.

The Will to Effect Change for Safety and Health

Through many years and many highly complex changes that have required extended efforts for solutions, the FPF industry and the PFA have demonstrated their proactive abilities to adapt to new safety and health information and work closely with regulatory agencies.

We participate in programs of the U.S. Fire Administration, the Fire-Safe Cigarette Coalition, the Fire Prevention Alliance and the Residential Fire Safety Institute.

The industry benefits from strong and consistent leadership, a highly effective trade association, and advanced technical capabilities. PFA members continue to work with suppliers and manufacturers to develop new methods to make the process and end-products better.

Looking to the future, PFA members are further addressing the need for greener products, as well as new formulations that may reduce some of the nation's dependence on petroleum.

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The Polyurethane Foam Association (PFA) supports our members' efforts to be responsible stewards of the environment by producing better performing products that emphasize health and safety and improve the flexible polyurethane foam (FPF) 'footprint' through recycling and sustainability based on seven principles:

1) Reduce solid waste. FPF products are recyclable. The FPF industry scrap collection and reuse system has developed into one of the most successful examples of recycling in the world. In the United States, nearly all manufacturing scrap is collected and recycled. Each year hundreds of millions of pounds of post-consumer waste FPF are diverted from landfills and recycled as bonded carpet cushion. PFA members are encouraged to improve the efficiency and widen the scope of post-consumer recycling efforts.

2) Maintain technical sessions to share scientific research about environmentally friendly materials and renewable feedstocks. PFA organizes technical programs twice a year as forums for presentation of relevant research and product innovations. Current bio-based raw materials now used within the FPF industry were introduced at PFA technical programs.

3) Support energy saving technologies. FPF manufacturing technology is an example of energy-efficient production. Through the use of an exothermic reaction, FPF is manufactured with little requirement for energy or water. PFA manufacturing members also conserve energy by utilizing over-the-road trailer and container compression techniques to increase capacity, thereby reducing fuel costs associated with transportation of FPF materials.

4) Continue efforts to improve product safety. PFA developed a voluntary analysis and evaluation program for FPF products. It promotes a high level of product safety for workers and the consuming public. The corresponding labeling program will enable end-product manufacturers, retailers and consumers to distinguish between FPF products that comply and those that do not.

5) Encourage sustainability through product performance. PFA's voluntary product analysis program includes physical performance requirements that establish a minimum level of product performance. It will help reduce raw material consumption and waste by increasing usable product life and, therefore, improve sustainability.

6) Educate to support sustainability. PFA created a "Community First" program to help manufacturing members share their commitment to environmental stewardship and manufacturing safety, and also engage their employees in this commitment.

7) Maintain continuous dialogue with leaders in sustainability. An effective sustainability program cannot be developed in a vacuum. PFA encourages input from NGOs, academia, customers and others involved in the implementation of sustainability initiatives.