S. HRG. 112–974

OVERSIGHT OF EPA AUTHORITIES AND ACTIONS TO CONTROL EXPOSURES TO TOXIC CHEMICALS

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON SUPERFUND, TOXICS AND ENVIRONMENTAL HEALTH

AND THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

JULY 24, 2012

Printed for the use of the Committee on Environment and Public Works

Available via the World Wide Web: http://www.fdsys.gov

U.S. GOVERNMENT PUBLISHING OFFICE

25–110 PDF WASHINGTON : 2017

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C O N T E N T S

OVERSIGHT OF EPA AUTHORITIES AND ACTIONS TO CONTROL EXPOSURES TO TOXIC CHEMICALS

TUESDAY, JULY 24, 2012

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
JOINT WITH THE SUBCOMMITTEE ON SUPERFUND, TOXICS AND ENVIRONMENTAL HEALTH,
Washington, DC.

The Committees met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Barbara Boxer (Chairman of the full Committee) presiding.

Present: Senators Boxer, Inhofe, Carper, Lautenberg, Cardin, Whitehouse, Merkley, Vitter, and Crapo.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. The hearing will come to order.

Before I read my opening statement and call on colleagues, I understand Representative Pingree is in the audience. Is she here? Welcome. I know that your daughter is testifying before us today. We are very happy to see you in the audience.

The purpose of this hearing is to review the need to reform the Toxic Substances Control Act, otherwise known as TSCA, the primary law that regulates chemicals in this country. TSCA, which was enacted in the 1970s, was intended to protect public health and ensure the safety of chemicals that are found in products that we use every day.

Unfortunately, this law has proven to lack the tools necessary to act swiftly and effectively when dealing with chemicals with potentially toxic effects. The weaknesses in the law were highlighted by a 1991 court decision where the court interpreted TSCA to require a complex process to obtain protections from asbestos, despite its obvious health hazards. It is clear that reforms are needed if the public is to have the protection that it deserves.

A good illustration of the critical need to reform our toxic laws is the experience with a group of flame retardants which was intended to protect public safety but has raised serious concerns about the risk they pose through the toxic chemicals they contain. And I am going to have a firefighter from my State testifying on this matter. Thus far, science has shown that these chemicals in the flame retardants cause cancer in animals.

We need to reform TSCA to provide incentives and ensure that the safest chemicals are used in our products so that the American public—including the most vulnerable among us, infants, children and pregnant women—are protected from toxic substances.

I want to commend Senator Lautenberg for his leadership and his hard work to move forward with needed reforms. He has worked tirelessly with stakeholders, including the chemical industry, the public health community, and across the aisle in the Senate to find common ground in this important effort.

The American people need us to reform TSCA, which is why I support Senator Lautenberg's determination to move a bill from this Committee and to broaden the discussion to the Senate floor. We must continue to work to develop consensus on this issue.

I look forward to hearing from witnesses today. It is time to take action on this public health issue.

And I call on Senator Inhofe.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Madam Chairman. And I will start by thanking both of you for holding today's oversight hearing. I also want to thank today's witnesses that are here.

Modernization of the Toxic Substances Control Act, TSCA, is important. But before we focus on today's hearing, I would like to take a moment to address the markup for Senator Lautenberg's TSCA bill tomorrow.

Senators Vitter, Crapo, Alexander, and I sent a letter to Senator Lautenberg yesterday expressing our disappointment that Republicans' sincere effort to work on a bipartisan TSCA reform had been rebuffed and that we will be going through a partisan political exercise tomorrow, effectively ending hopes for a TSCA modernization this year.

Tomorrow's markup is especially disappointing given how this Committee has already come together and worked so hard to get a highway bill passed. That is why Barbara and I are so happy today, that we are still on a roll, are we not, Barbara?

Chemistry is essential to our economy and plays a vital role in the creation of groundbreaking products that make our lives and world healthier, safer, and more sustainable. During this fragile economic time, the chemical industry is experiencing a competitive resurgence with more than 96 percent of all manufactured goods dependent upon chemistry. It is not hard to understand how this regulation impacts almost every aspect of our economy.

Having said that, it is imperative that any TSCA modernization efforts be bipartisan, based on sound science, protective of public health, and continue to allow American industry to lead the world through responsible innovation.

One subset of chemicals regulated by TSCA is flame retardants. These chemicals which are required in many instances to meet mandatory Federal and State laws and standards not only protect household goods like upholstered furniture but also electronics, cars, buildings, and airplanes. Despite the recent focus on furniture, foam cushions in the upholstered furniture represent only

about 2 to 3 percent of the total flame retardant usage in plastic applications in North America.

Flame retardants are one of many fire safety tools relied up on in homes and public places to reduce fire, injuries, and deaths, and they have made a significant impact in fire safety despite the increases in exposure to flammable materials in our daily lives.

Studies in the United States and abroad have proven the effectiveness of flame retardants in a wide variety of uses. For example, Dr. Matt Blais recently analyzed data from the National Institute of Justice Arson Study and found that flame retardants do provide measurable fire safety benefits in upholstered furniture by providing time for families to escape and increase the response for fire escape.

So, with that, I would like to enter that into the record——

Senator BOXER. Without objection. So ordered.

Senator INHOFE. Along with the Aerospace Industries Association letter relating to this subject.

The Chicago Tribune, which we will be hearing about a lot today, reported in 2005 on the effectiveness of flame retardants in seat cushions, carpets, and other materials following the crash of an Air France jetliner in Toronto when flight crews evacuated the flaming jumbo jetliner with no fatalities.

So, we do have some problems coming up in perhaps some industries that were not fully brought into the fold and have a great effect on our national security and other things.

So with that, we are looking forward to hearing more about this, and I think I would probably be opposing it as it is going to be introduced tomorrow, is it? Or it is the next day? Thursday?

Senator BOXER. We are going to be marking up tomorrow.

Senator INHOFE. Thursday, I believe.

Senator BOXER. Tomorrow? Yes, tomorrow.

Senator INHOFE. OK.

Senator BOXER. Well, thank you Senator.

Senator INHOFE. Thank you, Madam Chairman.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA

I want to start by thanking Chairman Boxer and Chairman Lautenberg for holding today's oversight hearing; I also want to thank today's witnesses. Modernization of the Toxic Substances Control Act (TSCA) is very important, but before we focus on today's hearing I would like to take a moment to address the markup of Senator Lautenberg's TSCA bill tomorrow.

Senators Vitter, Crapo, Alexander, and I sent a letter to Senator Lautenberg yesterday expressing our disappointment that Republicans' sincere efforts to work on bipartisan TSCA reform have been rebuffed and that we will be going through a partisan political exercise tomorrow, effectively ending hopes for TSCA modernization this year. Tomorrow's markup is especially disappointing given how this Committee has recently come together and worked so hard to get a highway bill passed into law and leading into our important bipartisan efforts to see if we can complete a Water Resources Development Act reauthorization. Despite our frustration, we will continue working to find a bipartisan path for TSCA modernization moving forward.

Chemistry is essential to our economy and plays a vital role in the creation of ground breaking products that make our lives and world healthier, safer, and more sustainable. During this fragile economic time, the chemical industry is experiencing a competitive resurgence, and with more than 96 percent of all manufactured goods dependent on chemistry it is not hard to understand how this regulation impacts

almost every aspect of our economy. Having said that, it is imperative that any TSCA modernization efforts be bipartisan, based on sound science, protective of public health, and continue to allow American industry to lead the world through responsible innovation.

One subset of chemicals regulated by TSCA is flame retardants. These chemicals, which are required in many instances to meet mandatory Federal and State laws and standards, not only protect household goods like upholstered furniture, but also electronics, cars, buildings, and airplanes. Despite the recent focus on furniture, foam cushioning in upholstered furniture represents only 2–3 percent of the total flame retardant usage in plastic applications in North America.

Flame retardants are one of many fire safety tools relied upon in homes and public places to reduce fire injuries and deaths, and they have made a significant impact in fire safety despite the increase in exposure to flammable materials in our daily lives.

Studies in the U.S. and abroad have proven the effectiveness of flame retardants in a wide variety of uses. For example, Dr. Matt Blais recently analyzed data from a National Institute of Justice arson study and found that flame retardants do provide measurable fire safety benefit in upholstered furniture by providing time for families to escape and increasing available response time for the fire service.

The Chicago Tribune, which we will be hearing a lot about today, reported in 2005 on the effectiveness of flame retardants in "seat cushions, carpets, and other materials" following the crash of an Air France jetliner in Toronto when flight crews evacuated the "flaming jumbo jetliner" with no fatalities.

As these reports have outlined, flame retardants can be an important and effective tool in protecting the American public. Any decision made by EPA or any other Federal agency should be based on sound, peer reviewed science—not politics or articles in newspapers—and the Agency should be very cognizant of shifting risks from one area to another.

As a father and grandfather of 20 children and grandchildren, I fully recognize the fact that we need to modernize TSCA and revive public confidence in our Federal chemical management system, but if we want to effectively update TSCA we also need to be honest about our current system—both about what it does well and what needs improvement. For example, even the EPA has acknowledged there are far fewer than 80,000 chemicals actively in commerce today.

We have also heard from numerous witnesses in this Committee, including Dr. Lynn Goldman, former Assistant Administrator for Toxic Substances under President Clinton, that EPA's new chemicals program has been a good process and has led "industry to screen out 'bad actors' before presenting them to EPA in the first instance."

Given the regulatory barrage by the Obama administration and his EPA, we must ensure that TSCA modernization is accomplished in a responsible manner while not harming the economy and shipping jobs overseas. In order to have real and effective reform, it must be accomplished in a bipartisan way with a broad base of support from a wide range of stakeholders, including those up and down the value chain.

I would like unanimous consent to include Dr. Blais's study into the record as well as a letter from the aerospace industry voicing concerns over EPA's current initiatives related to flame retardant chemicals. I look forward to hearing from the witnesses today.

[The referenced information follows:]

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WWW.FIRE.SWRI.ORG
FAX (210) 522-3377

Friday, July 20, 2012

The Honorable Senator James M. Inhofe
United States Senate Committee Environment and Public Works
Minority Office, Dirksen Senate Office Bldg
Washington, DC 20510-6175

Subject: Technical Report on the Impact of Fire Retardant Materials in Home Furnishings

Dear Senator:

Attached, please find a technical document written in the format of a white paper on the impact of fire retardants on foam-filled home furnishings. The data presented is abstracted from a testing report prepared and paid for by the National Institute of Justice, Department of Justice, cited as reference #1 in the white paper. This information was collected by an ISO certified testing lab that meets the highest standards of quality. In addition, this laboratory is an independent non-profit testing facility and the study was funded by the Federal Government. I hope you find the information useful in your deliberations.

Sincerely,

Matthew S. Blais, Ph.D.
Director
Fire Technology Department
Southwest Research Institute

The Utility of CA TB 117, Does the Regulation Add Value?

The implementation of CA TB 117 set minimum performance standards for furnishings in incipient fire situations. The intent was to protect life and property from fires initiated by small sources such as matches, cigarettes, lighters and candles. The standard was not intended to prevent ignition of a furnishing in a large fire where it would contribute to the fuel load of a room but not be the point of initiation.

Urethane foam filled furnishings have the potential for contributing tremendous energy to a fire and when not protected with flame retardants (FR) can lead to rapid transition from incipient fire to a free burning condition. The time to reach flashover (spread to the rest of the room) in a recent study performed at Southwest Research Institute (SwRI®) by Janssens et al[1]. was as short as 200 seconds from time of ignition. The addition of flame retardant covering over the foam adds a layer of defense that delays transition to flashover to almost 800 seconds from initiation. The additional use of CA TB 117 rated urethane foams prevented sustained burning when a small ignition source was used. In cases where the CA TB 117 foams are used with flammable coverings, significant reductions in both peak Heat Release Rate (HRR) and total HRR were measured and a significant delay in reaching the free burning condition was observed.

The impact of adding FR to the covering material and urethane foams adds defense in depth to the furnishing that undoubtedly saves lives. The fact that non FR furnishing contribute to flashover in a room in just over three minutes severely limits the potential for escape for a family in a fire situation. It also would likely result in the total loss of the home before a fire department could respond. Extending the time to greater than 13 minutes increases the probability of escape for the family and allows for greater response time and likely reduces the total damage sustained by the structure.

The cigarette ignition source is less important today than in the past due to a reduction in the number of smokers and changes in cigarette technology. Cigarette wrappers are self-extinguishing when there is not airflow for extended periods. However, ignition from a small flame source is still a significant problem for homeowners with small children. The following facts were obtained from US Fire Administration/National Fire Data Center:

- An estimated 20,200 residential structure fires in 2002, resulted in 276 deaths, 1,445 injuries, and $322 million in dollar loss[2].
- The leading causes of residential structure fires are incendiary/suspicious, open flame, and children playing with lighters and matches fires[2].

CA TB 117 uses ignition sources that mimic those found in the types of fires described. The testing performed in Janssens[1] is directly comparable to the CA TB 117 and CA TB 133 requirements. Three types of ignition sources were used: a small match-like flame; a large gas burner, similar to a fire in a pile of newspapers; and a small liquid pool fire simulating the use of an accelerant. Three ignition source locations were evaluated: exposing the seat from the top, exposing the furniture from the front bottom, and exposing the back.

Test Conditions

In most cases the small flame ignition source was BS 5852 Source #1 simulating a match fire. In a few tests the item could not be ignited with this source and BS 5852 Source # 2 was then tried simulating a lighter or candle. Both BS 5852 sources involve a diffusion burner consisting of a steel tube, with 8.0 mm outside diameter and 6.5 mm internal diameter and 200 mm in length, connected by a flexible tube via a rotameter, fine control valve, an optional on-off valve, and a regulator to a cylinder containing butane.

For Source #1, a flow rate of 45 ml/min at 25 °C was used, corresponding to a heat release rate of ca. 83 W and a flame height of 35 mm, measured from the top of the burner tube, when held vertically upwards. For Source #2, a flow rate of 160 ml/min at 25 °C was used, corresponding to a heat release rate of ca. 295 W and a flame height of 145 mm, measured from the top of the burner tube, when held vertically upwards. Butane gas was used as the fuel. The burner flame was applied for 20 s for Source #1, or 40 s for Source #2. Source #1 has been shown to have an intensity equivalent to a small match. The small flame source is shown in Figure 1 being applied to a chair mock-up.

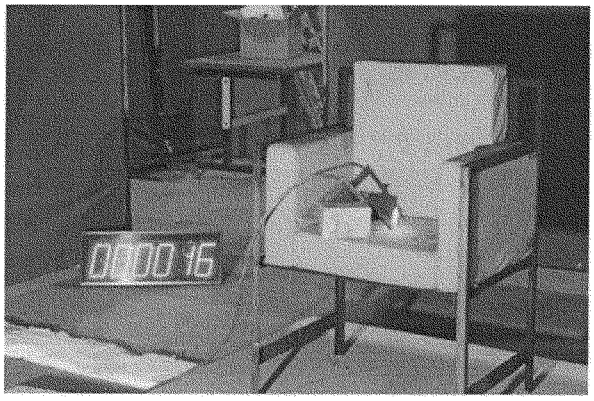


Figure 1: Small flame source

The propane burner described in CA TB 133 and ASTM E 1537 was chosen as the large flame ignition source exposing the seat from the top. This 250 × 250 mm square burner consisted of 13 mm outside diameter stainless steel tubing with holes pointing straight out, straight down and inward at a 45° angle at various locations. Propane gas with a net heat of combustion of 46.5 ± 0.5 MJ/kg was supplied at a rate of 13 l/min for a total of 80 s. The burner was an approximate intensity of 19 kW. Figure 2 shows the large flame source burner applied to a 3 cushion couch mock-up.

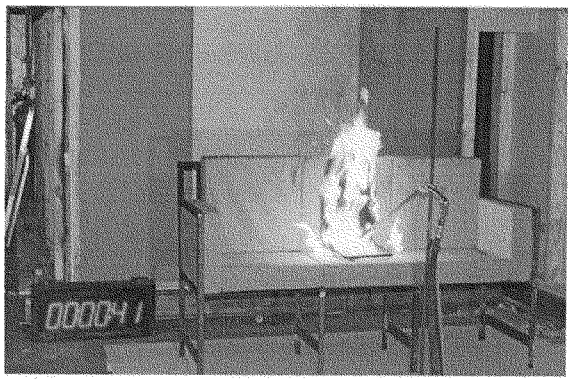


Figure 2: Large burner ignition source

The 0.3 × 0.3 m sandbox burner described in NFPA 286 was chosen as the large flame ignition source for front bottom and back exposure. The burner was supplied with propane at the same rate (19 kW) and for the same duration (80 s) as the CA TB 133 burner. Figure 3 shows the application of the large flame sandbox burner to the bottom front of a 3 cushion couch mock-up.

Figure 3: Large flame ignition source burner box

Finally, the liquid pool fire ignition source consisted of 59 ml (2 oz) of gasoline distributed over a seat cushion (top exposure) or 118 ml (4 oz) of gasoline distributed over 25 mm thick ceramic fiber blanket placed inside a 0.28 × 0.43 m metal cookie sheet (front bottom and back exposure)[1]. Figure 4 shows the accelerant ignition source for this series of tests applied to a center cushion.

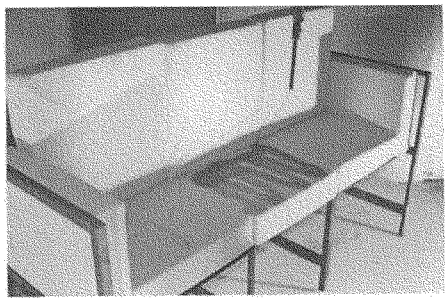


Figure 4: Accelerant ignition source

Test Items

Because of the questionable pedigree for used furniture items, most of the tests were performed on furniture mock-ups with metal frames. The mockup cushions were constructed with fabrics and padding materials that are common in furniture items that are currently on the market. Six different padding materials and two fabrics were selected. Chairs (without armrests) and single, double, and triple seat sofas were included in the test matrix. Table 1 shows the matrix of materials used to create the mock-ups for this series of tests.

Fabric	**ID**	**Color**	**Supplier**	**Weight (g/m^2)**
(Non-FR) Cotton	Eco Linen	Khaki	San Antonio Upholstery Fabrics	355
FR Cotton	Milano	Black	Dazian, N. Hollywood, CA	415
Padding	**ID**	**CA TB 117**	**Supplier**	**Density (kg/m^3)**
LD Polyurethane Foam	1030		San Antonio Upholstery Supply	17
HD Polyurethane Foam	25110		San Antonio Upholstery Supply	45
CA TB 117 PU Foam	FR1534	✓	San Antonio Upholstery Supply	23
Polychloroprene Latex	CR SAFGUARD XL	✓	Chestnut Ridge, Latrobe, PA	103
Polyester Wrap	Dacron	✓	San Antonio Upholstery Supply	16
Densified Polyester	FlameChek (Core)	✓	Bob Barker, Fuquay-Varina, NC	23

Table 1: Mock-up materials of construction

The FR Cotton fabric was verified to meet the requirements of NFPA 701. CA TB 117 tests were performed on specimens of the six padding materials to verify compliance (or non-compliance) with the standard. The test matrix used for this series of tests is summarized in Tables 2 and 3.

Table 2: Details of the Fractional Factorial Experiments.

	1-Seat Sofa (Fraction A)									**3-Seat Sofa (Fraction B)**								
LD Polyurethane Padding	✓	✓	✓							✓	✓	✓						
HD Polyurethane Padding				✓	✓	✓							✓	✓	✓			
CA TB 117 Foam PU Padding							✓	✓	✓							✓	✓	✓
Small Flame	✓			✓			✓			✓			✓			✓		
Large Gas Burner		✓			✓			✓			✓			✓			✓	
Liquid Pool Fire			✓			✓			✓			✓			✓			✓
Top	✓				✓				✓			✓	✓				✓	
Front Bottom			✓	✓				✓			✓				✓	✓		
Back		✓				✓	✓			✓				✓				✓

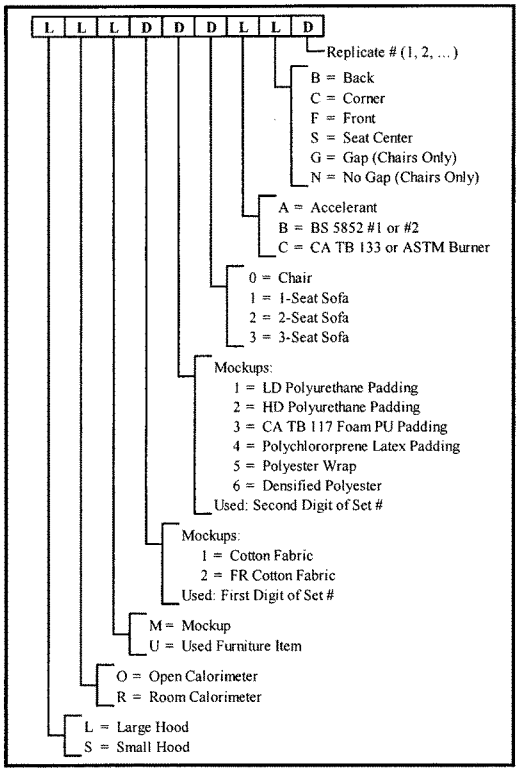
Table 3: Additional Room Calorimeter Tests on Mockups.

	Chairs						1-Seat Sofas							2-Seat Sofas			3-Seat Sofas				
(Non-FR) Cotton	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓		
FR Cotton											✓	✓	✓	✓						✓	✓	✓
LD Polyurethane Foam							✓															
HD Polyurethane Foam	✓			✓							✓	✓			✓			✓		✓	✓	
CA TB 117 PU Foam		✓			✓			✓	✓				✓	✓		✓						✓
Polychloroprene Latex																						
Polyester Wrap																						
Densified Polyester			✓			✓				✓	✓						✓		✓			
Small Flame							✓	✓										✓				
Large Gas Burner	✓	✓	✓	✓	✓	✓				✓		✓		✓	✓	✓		✓	✓			✓
Liquid Pool Fire									✓		✓		✓								✓	
Top Center	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Top Corner							✓											✓				
Front Bottom								✓	✓													
No Gap (Chairs Only)	✓	✓	✓																			
Gap (Chairs Only)				✓	✓	✓																
Number of Replicates	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1

Results and Discussion

A direct comparison of four conditions shows the applicability of having an FR requirement for home furnishings. The heat release rates measured of the duration of the test are shown in the four pairs of graphs below. The conditions are: a flammable cover over urethane foam, a FR cover over urethane foam, a flammable cover over FR foam, and a FR cover over FR foam. Table 4 provides the sample identification description dictionary that defines the test performed and material types. This can be used to show the materials of composition, test conditions, ignition source and ignition location.

Table 4: System for Composing and Deciphering the Test ID String.



A comparison of one cushion mockups with Low density non FR and FR urethane foams shows a reduction in the heat released. These two examples both have flammable covers. Comparing the time to fully involved fire environment, the peak HRR and the total Heat released (area under the curve), show that the fire resistant foam slows the onset of free burning fire by more than doubling the time from ignition to peak HRR (pHHR). The blue plot in both Figures **5** and **6** is the experimental data for these two conditions. All of the other plots are fire spread models attempting to predict the fire growth. The non FR foam seat ignites and reaches free burning in approximately 400 s. The CA TB 117 foam requires 1000 seconds to achieve pHHR. The pHRR and total heat released are also half for

the CA TB 117 foam when compared to the non-FR foam. These tests used the small flame ignition source. There are several examples of this exact relationship in Janssens work.

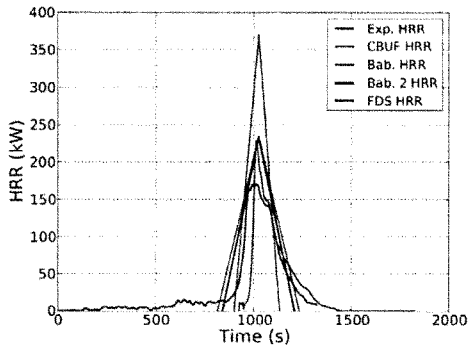


Figure 5: SRM131BB2 – CA TB 117 Urethane Foam with flammable cover.

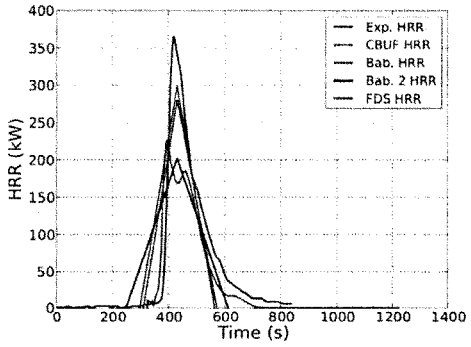


Figure 6: SRM111BS1 - Low density Urethane Foam with flammable cover.

Comparing the material cover of furniture mockups illustrates the utility of using NFPA 701 rated fabrics as covers for foam filled furnishings. The blue plots in Figures 7 and 8 illustrate the impact of using a FR fabric over high density foam of the same manufacturing lot using the same ignition source and location. Again the time from ignition of the couch to the free burning state is significantly delayed. The unprotected foam goes to a free burning state upon ignition. The foam protected with the NFPA 701 fabric shows a delay of 10 minutes to reach the same condition. It is also important to note that the pHRR is half the intensity for the FR case with 220 kW for the FR fabric compared to 440 kW for non

FR fabric. The total energy released by both events is approximately the same. This series of test used the large burner igniter shown in Figure 2. Use of the small burner BS5852 failed to ignite the FR test item.

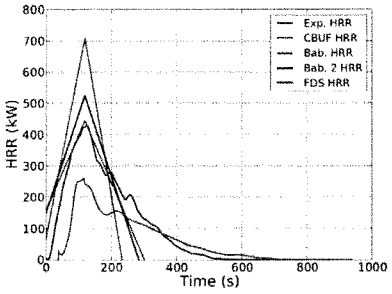


Figure 7: SOM121CS4.

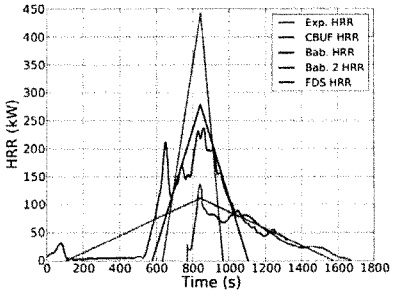


Figure 8: SOM221CS1.

The defense in depth approach of using both an FR fabric and CA TB 117 foam hugely impacts the fire event. Figures 9 and 10 compare the cases of three cushion couch mockups with and without FR foams IAW CA TB 117 and NFPA 701 covers. These figures show that with the large burner the protected couch failed to ignite while the unprotected couch reaches free burning in 180 s. The unprotected couch would cause the room to reach flashover in 4 minutes.

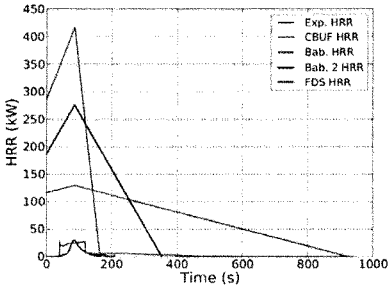


Figure 9: SRM233CS1.

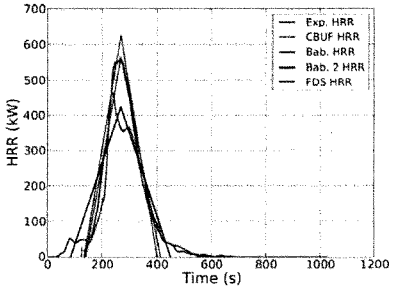


Figure 10: LRM113CF1.

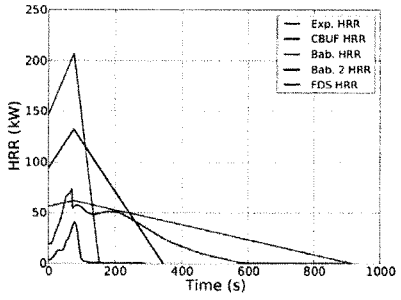


Figure 11: SOM231CS1.

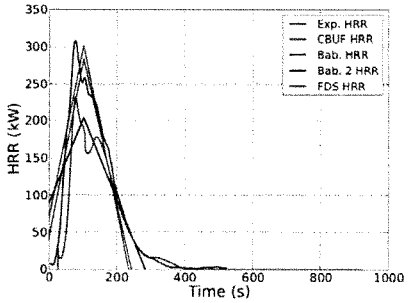


Figure 12: SOM111CS1.

Figures 11 and 13 show the same comparison for a single seat chair. The same no-ignition is seen for the CA TB 117 and NFPA 701 compliant cushion compared to rapid ignition of the unprotected cushion. The Ignition time for the case was even more rapid for this unprotected furnishing due to the location of the ignition source.

Conclusion

The best conclusion that can be drawn from the data presented here is that the use of CA TB 117 foam increases the fire safety of home furnishings by delaying the onset of free burning conditions and reducing the total energy released by the event. Using a NFPA 701 compliant cover over the FR foam prevents the furnishing from becoming the point of initiation with numerous examples in Janssen's paper self-extinguishing on removal of the ignition source, video's of these comparisons are available on request. What CA TB 117 does not do is prevent the furnishing from burning where there is already a free burning environment but that is not the intent of the regulation. The intent is to prevent the furnishing from becoming the initiation point of a large free burning fire caused by a small ignition source that could lead to trapping of occupants by preventing escape.

Dr. Matthew S. Blais
Director, Fire Technology Department
Southwest Research Institute

1. Reducing Uncertainty of Quantifying the Burning Rate of Upholstered Furniture, *No. 2010-DN-BX-K221, awarded by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice.* **December 30, 2011.**
2. U.S. Fire Administration/National Fire Data Center, Residential Structure Match− or Lighter−Ignited Fires, Topical Fire Research Series, Volume 4 – Issue 2, October 2004

June 19, 2012

The Honorable Jim Jones
Acting Assistant Administrator
Office of Chemical Safety and Pollution Prevention
EPA East Building, Room 3130
1201 Constitution Avenue, N.W.
Washington, DC 20460

Dear Assistant Administrator Jones:

On behalf of the members of Aerospace Industries Association, I thank you and your staff in the Office of Chemical Safety and Pollution Prevention for extending the comment period for the recent Notice of Proposed Rulemaking regarding Certain Polybrominated Diphenylethers; Significant New Use Rule and Test Rule (77 Fed. Reg. 19862, April 2, 2012). This extension will provide our members with important additional time to understand the impacts of this broad and complex proposal and to respond accordingly.

Founded in 1919, AIA is the premier trade association representing over 350 major aerospace and defense manufacturers and suppliers and approximately 844,000 aerospace and defense workers. Our members represent the United States of America's leading manufacturers and suppliers of civil, military, and business aircraft, helicopters, unmanned aerial systems, missiles, space systems, aircraft engines, material, and related components, equipment services, and information technology.

As you know, the U.S. aerospace industry is required to meet rigorous flammability requirements for many parts and components used to manufacture aircraft. These standards are intended to prevent fires in aircraft and to ensure, if a fire does occur, that there is adequate time for passengers and crew to escape the danger.

The benefits of these requirements have been significant. According to the Federal Aviation Administration's 2010 FAA Fire Safety Highlights, improvements in the survivability of transport aircraft accidents occurring between 1968 and 2007 has been "dramatic," as measured by the probability of death in a survivable accident. An important element of this improvement is the management of risks from fire. According to the FAA's 2010 Highlights report, the probability of death from fire in a survivable accident has declined by a factor of three over the past forty years. This is the result of work our member companies, the FAA and others have done to improve best practices and to identify and incorporate the most effective flame retardant materials to protect flying passengers and crew.

While we are proud of this success, we will continue to improve fire safety for all types of aviation. And as we continue developing better materials and solutions, we recognize the need to address other aspects affecting public health and the environment. With regard to the chemicals which are within the scope of this rulemaking, manufacturers are working diligently with their suppliers and regulatory authorities to find environmentally acceptable alternatives that will continue to meet all applicable flammability requirements. However, as we have discussed with members of your staff, we are concerned that our members cannot accomplish this work in the timeframe set out due to the vast size and complexity of the supply chain impacted by the

Aerospace Industries Association of America, Inc.
1000 Wilson Blvd., Suite 1700, Arlington, Virginia 22209-3901
Ph. (703) 358-1000 / Fax (703) 358-1011 www.aia-aerospace.org

proposed rule.

Again, we appreciate the extension of the comment period and the additional time it will allow our members to develop comments on the impacts of the proposed rule on our efforts to meet flammability requirements. As you and your staff consider our comments, we ask you to avoid taking regulatory action, either directly or indirectly, that would impair the ability of aerospace manufacturers to maintain and improve the current standards for safety in flight.

Thank you again for your commitment to these important issues.

Sincerely,

William C. Greenwalt
Vice President, Acquisition Policy

Senator BOXER. Well, thank you, Senator.
Senator Lautenberg.

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thanks, Madam Chairman.

It is regrettable that we find ourselves kind of landlocked here. When I introduced the first TSCA reform bill in 2005, in the 7 years since then we have held many hearings, briefings, stakeholder meetings, and negotiations. During that time, our office has had an open door policy. My staff and I have conducted dozens of meetings with groups on all sides of the issue. And more than 2 years ago, in this very room, I said that my State Chemicals Act should be considered an invitation for all to play a part. And I have reiterated that call for Republican input at almost every opportunity.

Last summer and fall Senator Inhofe and his staff joined us to hold a series of 10 meetings to better understand his concerns and those of industry. And this summer I was pleased when Senator Vitter reached out and expressed his interest in working together on TSCA reform. At the end of May I agreed to discussions but made clear that we needed to show progress, that we could not engage in things that might delay us getting to something of value and help.

After 7 weeks of talks, we were still discussing the first of many topics on our agenda. My staff proposed new comprised language on a number of sections, but we never received a single counterproposal. This week's Committee markup may be the last in this Congress. And I—and millions of people across this country—did not want another year to pass without progress on toxic chemicals.

And so we will be voting tomorrow on a bill that has evolved to reflect years of input from all parties. And I hope that my friends across the aisle will give it fair consideration. Let us air it out here. Let us talk about it. Be here and show the interest that should be shown to say that we want to continue to work together to bring out something that is worth the effort.

And when we—so, what has happened this spring, the Chicago Tribune ran an exposé about how some in the chemical industry have used dirty tricks and bad science to drive a public misinformation campaign that keeps dangerous flame retardants in our home, even when those chemicals do not do what they are supposed to do, and that is prevent fires.

The industry has been accused of bankrolling so-called experts to invent stories that spout the company line, all this service of protecting their profits, and all of that at the expense of safety and health. Many companies, many countries, require chemicals like flame retardants to be tested, proven safe before they end up in stores and then in our homes. But not in the United States.

And that is why Senator Snowe and I recently sent a bipartisan letter to EPA signed by 24 of our Senator colleagues urging the agency to take action on a class of flame retardants. Our letter also called for real reforms to the Toxic Substances Control Act.

But let us be clear. Flame retardants are only one example of the problems that we have with our system of regulating chemicals.

Studies by CDC scientists found 212 industrial chemicals, including six linked to cancer coursing through American bodies. But in nearly 35 years, EPA has been able to regulate only five substances using the tools of TSCA.

My TSCA reform bill, the Safe Chemicals Act, will simply require chemical manufacturers to display, demonstrate that their products are safe before they end up in bodies. Most of the thousands of chemicals that are used every day are safe. But this bill will separate those safe chemicals from the ones that are not.

We first began examining the problem with TSCA in 2005. So, this is not a new subject. It is a subject that really you would think would wear out of its own weight. But no, we persisted, because it is our obligation to the people in our country.

So, I am proud that this Committee will vote tomorrow on the Safe Chemicals Act. I believe today's hearing will add further evidence that we cannot delay any longer.

And I publicly invite Senator Vitter and colleagues on the other side to come along. Let us discuss it. Let us show that there is enough interest to get a response to the changes that we have made. We have made many to try to accommodate our colleagues.

So, thank you, Madam Chairman, for the opportunity to do this.

Senator BOXER. Thanks, Senator.

Senator Crapo.

OPENING STATEMENT OF HON. MIKE CRAPO, U.S. SENATOR FROM THE STATE OF IDAHO

Senator CRAPO. Thank you very much, Senator Boxer. I appreciate you and Senator Lautenberg for scheduling today's hearing on EPA's authorities and actions for controlling exposures to toxic chemicals generally and to flame retardants specifically.

I also appreciate the participation of the witnesses who have agreed to answer and appear here this morning. The first panel features the testimony of James Jones, the Acting Assistant Administrator of the EPA's Office of Chemical Safety and Pollution Prevention, who is responsible for implementing the provisions of the Toxic Substances Control Act.

I look forward to hearing Mr. Jones' opinion regarding EPA's implementation of TSCA and how it works to help ensure an effective and efficient Federal regulatory regime that is capable of protecting public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness. and job creation.

The five witnesses that comprise the second panel represent a diverse set of interests and experiences. This diversity is valuable for understanding the multiple facets of what is a highly complex regulatory challenge, and I thank them for their participation and look forward to their testimonies.

There has been much written and much said about the regulation and use of flame retardants in commerce. As we will hear today, there is substantive proof that flame retardants are effective in saving lives by delaying the spreading of fire and allowing people additional time to escape injury. We will also hear divergent views regarding the safety of flame retardants and EPA's regulatory authority under TSCA.

Under current TSCA framework, EPA and industry conducted extensive reviews of flame, of the current flame retardants, and EPA approved their use on the market. Further, EPA has not invoked its authority under TSCA to remove these chemicals from the market.

Because of the obvious diversity of opinion regarding the efficacy of flame retardants and other chemicals, it is critical that we support a regulatory framework that is risk based and further grounded in peer reviewed science. Our understanding of the possible health effects of flame retardants is constantly evolving. Therefore, we must be pragmatic in our regulatory approaches and mindful of the consequences of jumping to conclusions that have not been definitely proved by science.

Tomorrow, this Committee will meet to mark up several pieces of legislation including Senator Lautenberg's Safe Chemicals Act. My office, as has been indicated already, along with several others had, until last week, been actively engaged with Senator Lautenberg's office to develop a bipartisan path forward for TSCA reform. I am disappointed that we will now move forward and abandon this process and tomorrow consider a bill that is still controversial and does not represent the bipartisan consensus building that we have been seeking to achieve.

As I stated earlier, effective regulatory frameworks must seek to protect health and safety while promoting economic growth. This balance is difficult and cannot be achieved unilaterally.

Again, I appreciate the participation of the panel members this morning, and I look forward to your insight.

Senator BOXER. Thank you so much.

Senator Vitter.

OPENING STATEMENT OF HON. DAVID VITTER, U.S. SENATOR FROM THE STATE OF LOUISIANA

Senator VITTER. Thank you, Madam Chair and Ranking Member Inhofe, for the hearing. And certainly there is no disagreement in terms of the broader issue we are here about, that there is need for TSCA reform, a law which really has not been updated significantly since 1976.

And I want to commend Senator Lautenberg for his priority and focus for several years with regard to reform. I know it is very deep and very sincere. As has been stated, Senators Inhofe and Crapo and Alexander, as well as myself, have very actively engaged with Senator Lautenberg, meeting at the staff level weekly, if not more, over an extended period of time.

Unfortunately, those of us on this side all view this hearing and the partisan markup to follow tomorrow as a diversion from that, an interruption from that. And we think it is unfortunate.

But I, for one, remain completely committed to getting back to that bipartisan process so that we can produce a good consensus bill that can actually pass the Senate and the House. And that is what I remain committed to. Again, I think this diversion is unfortunate, but it is not going to shake that commitment on my part.

TSCA is very important. We need to reform it and we need to get that right. From my perspective in Louisiana, I will tell you a

few reasons we need to get it right because this industry, which is so important for the nation, is certainly important for our economy.

Chemical companies in Louisiana directly employ over 22,000 people and indirectly contribute 158,000 jobs to the economy. For every direct job in Louisiana, another 5.5 jobs are created in the State. An average wage we are talking about for those direct jobs is very healthy, over $84,000, 47 percent higher than the average manufacturing wage. These jobs generate $1.9 billion in earnings and almost $1 billion in tax revenue and $962 million in Social Security and Medicare contributions.

Let me also focus for a minute about the need to reform to get it right because I think we have had a lot of evidence in the last few years in particular how the present regime with regard to regulation is getting it wrong.

In particular, I was very involved in demanding a National Academy of Science study with regard to one particular chemical, formaldehyde, when EPA was pushing an aggressive agenda regarding this. We finally got that independent NAS study, and unfortunately, it underscored and really proved a lot of our concerns about the IRIS process in general. Let me just point to some of the conclusions from that study.

This is the National Academy of Science, a very mainstream, respected organization. They said "Problems with clarity and transparency of the methods appear to be a repeating theme over the years." They said "The conclusions appear to be based on a subjective view of the overall data." And "The causal determinations are not supported by the narrative provided."

And then finally, EPA overstated the evidence to deem formaldehyde a neurotoxic. The human data are insufficient, and the candidate animal studies deviate substantially from testing guidelines and common practice.

Unfortunately, this was not an isolated incident. It is a much broader issue, at least with the whole IRIS process. And because of that, the EPA itself even admitted the need for fundamental reform, Dr. Paul Anastas saying in July 14 of last year, "Over the coming months, the IRIS program will fully implement the NAS recommendations and continue to improve the IRIS process to reflect the highest standards of scientific integrity and credibility."

We are still not there, and TSCA reform based on sound science, based on bipartisan consensus, is absolutely necessary to get us there. So, after this distraction this week, I really hope we get back to that important hard work of mainstream TSCA reform.

Thank you, Madam Chair.

Senator BOXER. Thank you very much.

Now we will turn to our first witness, Hon. Jim Jones, Acting Assistant Administrator for the Office of Chemical Safety and Pollution Prevention, U.S. EPA.

Welcome.

STATEMENT OF JAMES J. JONES, ACTING ASSISTANT ADMINISTRATOR, OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION, U.S. ENVIRONMENTAL PROTECTION AGENCY

Mr. JONES. Good morning, Chairman Boxer, Senator Lautenberg, Ranking Member Inhofe, and members of the Committee. Thank

you for the opportunity to address you today on the reform of chemical management and our authority to assess the safety of flame retardant chemicals.

Ensuring chemical safety, maintaining public confidence that EPA is protecting the American people, and promoting our global leadership in chemicals management remain top priorities for the EPA and Administrator Jackson. I want to thank you both, Senator Boxer and Senator Lautenberg, as well as members of the Committee, for your continued leadership on this very important issue and your efforts to bring about reform of TSCA.

With each passing year, the need for TSCA reform grows. Chemicals are found in most everything we use and consume, and they are essential for our health, our well-being, and our prosperity. It should be equally essential that chemicals are safe. Today I will discuss a prime example of the shortcomings of TSCA that stands as a clear illustration of the need for TSCA reform.

So, what are the problems with TSCA? When TSCA was enacted, it grandfathered in, without any evaluation, the 62,000 chemicals in commerce that existed in 1976. The TSCA inventory currently lists over 84,000 chemicals, few of which have been studied for their risks, especially to children.

Unlike the laws applicable to drugs and pesticides, TSCA does not have a mandatory program where EPA must conduct a review to determine the safety of existing chemicals. The manufacturers do not need to demonstrate the safety of new chemicals before they are introduced into the marketplace.

When EPA determines that a chemical imposes a significant health concern, taking action under TSCA to limit or ban a chemical is challenging. To address these shortcomings, in September 2009 the EPA Administrator, Lisa Jackson, announced a set of administration principles to update and strengthen TSCA. These include that manufacturers provide EPA with the necessary information to conclude that new and existing chemicals are safe, and the agency should have the tools to quickly and efficiently obtain information from manufacturers that is relevant to determining the safety of chemicals. The EPA should also have clear authority to assess chemicals against a safety standard and take risk management actions when chemicals do not meet the safety standard.

While the legislative reform process is under way, we are not just standing by. The agency is utilizing the current authority under TSCA to help protect human health and the environment. Earlier this year, EPA developed a screening process to identify chemicals for review based on their hazard, exposure, and persistence and bioaccumulation characteristics.

We identified 83 work plan chemicals for risk assessment with an initial of seven for assessment for this year. In June we identified an additional 18 chemicals that the agency intends to review and then develop risk assessments in 2013 and 2014, including three flame retardant chemicals.

EPA's experience with one flame retardant in particular highlights the limitations of TSCA. The EPA first reviewed a new flame retardant component, TBB, in several products in 1995 for use in foam and was unable to identify that is was persistent and bioaccumulative. We only learned of these properties after the chem-

ical was in commerce and was later found in humans and the environment. Also in the formulation was an existing flame retardant chemical, TBPH. Further research has shown that this existing chemical has similar concerns, but it, too, is persistent and bioaccumulative.

This example illustrates the problems we face with both new and existing chemicals since taking the necessary steps to ensure that new chemicals or chemical already in commerce are safe can be cumbersome, involve regulatory processes that take years before hazards are addressed. TBB and TBPH are two of the flame retardants that EPA will evaluate in 2013, 18 years after TBB was first introduced into the market. This is an example that highlights the critical need for the agency to have greater evidence that new chemicals are safe prior to commercialization and stronger tools to take action after they are on the market to ensure safety.

The American public has the right to expect that chemicals manufactured, imported, and used in this country are safe. And EPA needs an effective law that gives us the tools necessary to provide the public with these assurances. TSCA must be updated and strengthened so that EPA has the tools to do our job of protecting public health and the environment. The time to fix this badly outdated law is now.

I will be pleased to answer any questions that you may have.

[The prepared statement of Mr. Jones follows:]

Testimony of James J. Jones
Acting Assistant Administrator
Office of Chemical Safety and Pollution Prevention
U.S. Environmental Protection Agency
before the
Committee on Environment and Public Works
and the
Subcommittee on Superfund, Toxic and Environmental Health
United States Senate

July 24, 2012

Good morning Chairman Boxer, Chairman Lautenberg, Ranking Member Inhofe, Ranking Member Crapo and members of the committee. Thank you for the opportunity to address the committee today on the reform of chemicals management in the United States and the U.S. Environmental Protection Agency's (EPA) authority to assess the safety of flame retardant chemicals under the Toxic Substances Control Act (TSCA). Ensuring chemical safety, maintaining public confidence that the EPA is protecting the American people, and promoting our global leadership in chemicals management remain top priorities for the EPA and Administrator Lisa Jackson.

I want to thank this committee for your continued leadership on this very important issue and your efforts to bring about reform of TSCA. With each passing year, the need for TSCA reform grows – the importance and prevalence of chemicals in our daily lives increases, and yet there remain significant gaps in our knowledge and understanding of many of these chemicals. The time to bring TSCA into the 21st Century is long overdue. Today, I also want to discuss a prime example of the shortcomings of TSCA – the limited success and long history of the agency's work on brominated flame retardants – that stands as a clear illustration of the need for TSCA reform.

Chemicals are found in most everything we use and consume, and can be essential for our health, our well being, and our prosperity. It should be equally essential that chemicals are safe. Compared to 30 years ago, we have a better understanding of the environmental impacts, exposure pathways, and distressing health effects some chemicals can have – especially on children. While our understanding of chemical safety is constantly evolving, significant gaps in our scientific knowledge regarding many chemicals remain. For these reasons, it is critical that we close those knowledge gaps. Recent press reports on flame retardants highlight the public health risks posed by certain chemicals such as flame retardants. Public understanding of these risks is growing, and that is why the public is increasingly demanding that the government provide an assurance about chemicals, even chemicals like flame retardants that can also provide significant benefits. To date, based on these concerns, the EPA helped negotiate voluntary phase-outs of several of the more toxic retardants, and has also initiated regulatory actions; however, as explained in more detail below, TSCA reform would have given the EPA additional tools to address this serious issue.

Background on TSCA

The EPA's chemical management authority is carried out under TSCA — a law that when enacted in 1976 was an important step forward to protect human health and the environment. But today, TSCA is the only major environmental statute that has not been reauthorized. Over the years, not only has TSCA fallen behind the rapidly advancing industry it is intended to regulate, it has also proven an inadequate tool for providing the protection against chemical risks that the public rightfully expects and deserves.

When TSCA was enacted, it grandfathered in, without any evaluation, the 62,000 chemicals in commerce that existed in 1976. The TSCA Inventory currently lists over 84,000 chemicals, few of which have been studied for their risks, especially to children. Unlike the laws applicable to drugs and pesticides, TSCA does not have a mandatory program where the EPA must conduct a review to determine the safety of existing chemicals.

And the process of requiring testing through rulemaking chemical-by-chemical has proven time consuming. As a result, in the 35 years since TSCA was passed, we have only been able to require testing on approximately 200 of the 84,000 chemicals listed on the TSCA Inventory. The EPA has also relied on voluntary programs to collect data, including through the High Production Volume (HPV) Challenge Program, which resulted in the submittal of screening level data for 1,366 HPV chemicals.

When the EPA determines that a chemical poses a significant health concern, taking action under TSCA to limit or ban a chemical is challenging. For example, in 1989, after years of study and nearly unanimous scientific opinion, the EPA issued a rule phasing out most uses of the cancer causing substance asbestos. Yet, a federal court overturned most of this action because the EPA failed to clear the hurdles imposed under TSCA before existing chemicals can be controlled.

Today, advances in toxicology and analytical chemistry are enhancing our understanding of the implications of multiple pathways of exposure, and a better understanding of the cumulative effects and interactions between the chemicals in the products we use every day. The EPA is working to develop methodology to address potential health effects of multiple chemical exposures and evaluate cumulative risks. When TSCA was enacted, there was not the understanding of the subtle effects chemicals may have on hormone systems, human reproduction, and intellectual development and cognition, particularly in young children.

Essential Principles for Reform of Chemicals Management Legislation

In September 2009, the EPA Administrator Jackson announced a set of administration principles to update and strengthen TSCA. These include that the agency should have the tools to quickly and efficiently obtain information from manufacturers that is relevant to determining the safety of

chemicals. The EPA also should have clear authority to assess chemicals against a safety standard and to take risk management actions when chemicals do not meet the safety standard.

At the same time, Administrator Jackson also affirmed that, while the legislative reform process is underway, the agency is committed to utilizing the current authority under TSCA to the fullest extent to protect human health and the environment.

Work Plan Chemicals

Earlier this year, the EPA developed a screening process to identify chemicals for review based on their combined hazard, exposure, and persistence and bioaccumulation characteristics. This process included criteria specifically targeted at identifying chemical risks to children. Following this initial screen, the EPA identified 83 work plan chemicals for risk assessment in the TSCA chemicals management program, with an initial seven for risk assessment in 2012.

On June 1, 2012, the EPA identified an additional 18 chemicals that the agency intends to review and then develop risk assessments in 2013 and 2014, including three flame retardant chemicals -- Bis(2-Ethylhexyl)-3,4,5,6-tetrabromophthalate (TBPH), 2-Ethylhexyl-2,3,4,5-tetrabromobenzoate (TBB), and Tris(2-chloroethyl)phosphate (TCEP). The EPA is currently developing a strategy, scheduled for completion by the end of this year that will address these three and a broader set of flame retardant chemicals. This effort will assist the agency in focusing risk assessments on those flame retardant chemicals that pose the greatest potential concerns. The EPA anticipates initiating the risk assessments on this category of chemicals in 2013.

Polybrominated Diphenyl Ether (PBDE) Flame Retardant Chemicals

The EPA is concerned that PBDEs are persistent, bioaccumulative, and toxic to both humans and the environment. A critical endpoint of concern for human health is neurobehavioral effects during development, which makes them a concern for children's health. Various PBDEs have also been studied for ecotoxicity in mammals, birds, fish, and invertebrates. In some cases, current levels of exposure for wildlife may be at or near adverse effect levels.

PBDEs are not chemically bound to plastics, foam, fabrics, or other products in which they are used, making them more likely to leach out of these products. Despite the U.S. phasing out the manufacture and import of penta- and octaBDE in 2004, their component congeners PBDEs are still being detected in humans and the environment. Some reports indicate that levels are increasing[1]. One potential source is imported articles to which these compounds have been added. Another is the breakdown of decaBDE in the environment to more toxic and bioaccumulative PBDE congeners. In late 2009, the U.S. manufacturers of decaBDE announced that they intend to voluntarily phase out most uses of decaBDE by the end of 2013.

[1] Shaw SD, Kannan K. 2009. Polybrominated diphenyl ethers in marine ecosystems of the American continents: foresight from current knowledge. *Rev Environ Hlth* 2009, *24,* 157-229

Efforts on PBDE Flame Retardant Chemicals

In late 2009, the EPA released an Action Plan for addressing concerns with PBDE flame retardant chemicals and recently issued proposed rules that would require additional testing on these chemicals and require the EPA review any new uses of these chemicals, including imported articles. The EPA also helped facilitate an industry plan to phaseout decaBDE and launched a multi-stakeholder partnership to assess alternatives for this chemical to help move the market to safer chemicals. This follows the EPA's earlier facilitation of an industry phaseout of two other widely-used PBDE flame retardants, pentaBDE and octaBDE in 2004 and an associated partnership to help identify safer flame retardants for use in polyurethane foam.

In its 2009 Action Plan, the EPA committed to support and encourage the voluntary phase out of the manufacture and import of decaBDE. Developed with public participation through the EPA's Design for the Environment Program, the EPA will shortly release the draft alternatives assessment on decaBDE for public comment. This assessment will profile the environmental and human health hazards on 30 alternatives to decaBDE. By providing a detailed comparison of the potential human health and environmental effects of chemical alternatives, the EPA can help manufacturers identify and transition to safer alternative flame retardant chemicals.

The EPA first reviewed a new flame retardant component of several products in 1995 for use in polyurethane foam and was unable to identify that a component of flame retardants was persistent, bioaccumulative and toxic. Later, after the chemicals were in commerce, information became available that showed the chemicals were being found in humans and the environment. This is an example that highlights the critical need for the agency to have greater evidence that new chemicals are safe prior to commercialization and to be able to take effective action after commercialization, when needed. Unfortunately, taking the necessary steps to ensure that chemicals already in commerce are safe can be a cumbersome, involved regulatory process that can take years.

While the latest steps taken by the agency are clearly a step forward, they must be viewed in the context of what has been a long history of actions on flame retardants, a history that has stretched over the course of two decades with a range of voluntary efforts and regulatory actions on flame retardant chemicals in both the EPA's new and existing chemicals programs. The long history of the EPA's action on brominated flame retardants is tied in no small part to the shortcomings of TSCA.

Summary

Simply put, the EPA may have made a different determination in 1995 if TSCA required the submission of more robust hazard, exposure, and use data needed to adequately assess risk, and the EPA may have been able to act more quickly and effectively on the risk information available if TSCA provided more robust tools to deal with chemicals already introduced into commerce. The American public has the right to expect that the chemicals manufactured, imported, and used in this country are safe and the EPA needs an effective law that gives us the tools necessary to provide the public with this assurance. The time is now to fix this badly outdated law. TSCA must be updated and strengthened so that the EPA has the tools to do our job of protecting public health and the environment.

I would be happy to answer any questions you may have.

Senate Environment and Public Works Committee
Hearing on "Oversight of EPA Authorities and Actions to Control Exposures to Toxic Chemicals"
Questions for the Record
Jim Jones, Acting Assistant Administrator
Office of Chemical Safety and Pollution Prevention
July 24, 2012

Senator Barbara Boxer, Chairman

Boxer 1. A study by researchers at the University of California at San Francisco detected certain PBDEs, PCBs, phthalates, pesticides, perchlorate and other chemicals in the blood of 99 to 100% of pregnant women that they tested.

1a. Can pre-term exposure to chemicals increase the risk of harmful health effects?

Answer: As a general matter, the mere presence of chemicals in the blood does not necessarily indicate harmful effects. Observational studies with human subjects and laboratory studies with animals can be used to study health effects from exposure to chemicals. Some laboratory studies with animals have shown that pre-term exposure to some chemicals can cause harmful health effects to the offspring if the exposure or dose to the pregnant animal is high enough, and occurs during a critical period of fetal development.[1] Observational studies with human subjects can also demonstrate health effects from exposure to chemicals.

1b. If so, please describe the range of such harmful health effects that can occur as a result of such exposures, including any impacts that may harm reproduction or development in later generations of people?

Answer: Both the effects of exposure and the likelihood (risk) that people might develop that effect vary significantly by chemical (mode and mechanism of action), the dose received, and the timing of exposure. Laboratory animal and non-animal studies to understand reproductive and developmental effects in later generations of people is currently an active research area, but uncertainties remain regarding such studies' relevance to humans, at the doses where effects are seen in test systems. The EPA's Guidelines for Developmental Toxicity Risk Assessment[2] provides a description of the endpoints commonly measured in laboratory animal studies and human epidemiological studies. The EPA also uses multigenerational reproductive toxicity assays in laboratory animals to assess potential impacts on future generations.

Boxer 2. One study published last year by researchers from the California Department of Toxic Substances Control and the University of California at San Francisco studied blood samples from pregnant women in California – and found that they generally had higher levels of PBDEs than other women in the United States, as well as Europe and Asia, and that the women also had lower levels of hormones produced by the thyroid.

2a. What impact does the thyroid have on ensuring the healthy development of infants and children?

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[1] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3114826/pdf/ehp-119-878.pdf
[2] http://www.epa.gov/raf/publications/pdfs/DEVTOX.PDF

Answer: Please note that the observation of the presence of a chemical in human blood samples coupled with observations of altered hormone levels or other outcomes does not establish causation. The thyroid gland and thyroid hormones play an important role in the body throughout life. Every cell in the body relies on thyroid hormones to work properly. Important functions mediated by thyroid hormones include, but are not limited to: metabolism; muscle and joint function; cardio vascular fitness; digestions; bone health; hormone balance; and brain function. In infants and children, proper levels of thyroid hormone influence these functions as well as the normal progression of development. A known consequence of abnormal thyroid hormone levels during development is abnormal neurological development. For example, extremely low dietary iodine levels over a significant amount of time, most commonly in parts of the world with iodine-deficient diets, results in lowered production of thyroid hormones and this has resulted in neonatal hypothyroidism with severe physical and mental retardation in children. Note that there is a range of normal variability in hormone levels; the presence and severity of adverse effects depends on the magnitude of hormone level alteration. With less extreme hypothyroidism and poor iodide intake, the National Academy of Sciences has stated[3]:

> "Newborn infants who have hypothyroidism may have other abnormalities, including lethargy, poor muscle tone, poor feeding, constipation, and persistent jaundice, if not at birth then thereafter. The changes are similar to those which occur in older children and adults who have hypothyroidism, and, in contrast with the neurologic abnormalities, they are reversible with adequate T4 [thyroid hormone] treatment."
>
> "Pregnant women who have subclinical hypothyroidism or overt hypothyroidism and are inadequately treated or not treated at all have an increased risk of fetal loss. The infants of those mothers who do not miscarry have normal thyroid function at birth and thereafter, but their neurodevelopment may be slightly impaired."

2b. What impact can lower levels of thyroid hormones have on a woman's ability to become pregnant and to carry that pregnancy to term?

Answer: In adult females, if altered sufficiently, thyroid hormone levels can influence a woman's ability to become pregnant and to maintain that pregnancy. Important functions relevant to reproduction that are mediated by thyroid hormones include, but are not limited to: sexual function and libido, hormone balance, and ovulation. With regard to carrying pregnancy to term, the National Academy of Sciences stated[4]: "Pregnant women who have subclinical hypothyroidism or overt hypothyroidism and are inadequately treated or not treated at all have an increased risk of fetal loss."

2c. How can the differing levels of PBDE in the blood of pregnant women help to inform risk assessment and risk management decisions?

Answer: Biomonitoring studies provide valuable information on exposure and are most beneficial when used with an understanding of a chemical's toxicity. Blood levels (or levels in urine or a tissue such as fat) of a specific chemical reflect exposure from ingestion, inhalation and other exposure

[3] From: Chapter 2, "The Thyroid and Disruption of Thyroid Function in Humans" in Health Implications of Perchlorate Ingestion (2005).
[4] *Ibid.*

pathways. With an understanding of how a chemical is distributed and transformed in the body, biomonitoring data can be used in conjunction with toxicity data to inform the potential risk from exposure to that specific chemical. Thus, knowledge of the levels of a chemical in people's blood can have a significant impact on risk assessment. Further, when coupled with knowledge of the sources and pathways of exposure, biomonitoring can be of value in informing decisions on risk reduction through reduction in specific exposures.

Boxer 3. In 2012, EPA issued an Existing Chemicals Program Strategy to identify chemicals for review based on various factors, including a chemical's potential for exposure, persistence, and bioaccumulation. The Agency issued Work Plans to begin assessing 83 chemicals in 2012. The EPA has also issued work plans to assess 18 more chemicals, including 3 flame retardants – beginning in 2013. In your testimony, you state that EPA is currently developing a strategy, scheduled for completion by the end of this year, to address flame retardant chemicals.

3a. Please describe whether TSCA provides EPA with the necessary tools to fully assess the risks of flame retardant chemicals?

Answer: When the Toxic Substances Control Act (TSCA) was enacted in 1976, it represented an important step forward in addressing the risks from industrial chemicals by granting the EPA jurisdiction over chemicals produced, used, and imported in the United States. Today, TSCA is the only major environmental statute that has not been reauthorized. Unlike the laws applicable to drugs and pesticides, TSCA does not have a mandatory program where the EPA must conduct a review to determine the safety of the more than 84,000 existing chemicals. In addition, TSCA places challenging legal and procedural requirements on the EPA before the agency can request the generation and submission of any health and environmental effects data on existing chemicals.

The EPA has developed a more effective program under TSCA to review new chemicals before introduction to the marketplace. The EPA uses professional judgment and information on similar chemicals to evaluate existing chemicals.

3b. Please describe whether TSCA provides EPA with the necessary tools to fully address the risks posed by such chemicals through implementing and enforcing risk management decisions?

Answer: When the EPA determines that a chemical poses a significant health concern, taking action under TSCA to limit or ban a chemical is challenging. For example, in 1989, after years of study and nearly unanimous scientific opinion, the EPA issued a rule phasing out most uses of the cancer causing substance asbestos. Yet, a federal court overturned most of this action because the EPA failed to clear the hurdles imposed under TSCA before existing chemicals can be controlled.

The agency is committed to utilizing the current statute to the fullest extent possible and taking risk management actions to address chemicals that may pose a concern— including brominated flame retardants (BFRs). For example, in late 2009, the EPA released an Action Plan on polybrominated diphenyl ethers (PBDEs), a group of BFRs, that highlighted concerns and specific steps the agency is taking to address those concerns.[5] In April 2012, the EPA proposed a rule requiring additional testing of

[5] U.S. EPA, Polybrominated Diphenyl Ethers (PBDEs) Action Plan Summary (2009), http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/pbdes_ap_2009_1230_final.pdf.

these chemicals and the requirement that any new uses of these chemicals be submitted to the agency for review.[6] The EPA is also working with the industry and a wide range of stakeholders, under our Design for the Environment Program, on assessing alternatives to some of these chemicals to inform choices of alternatives.[7]

On March 27, 2013, the EPA made public a list of 23 chemicals for assessment beginning in 2013. The EPA will conduct full risk assessments on four flame retardant chemicals. The four flame retardant chemicals are 2-Ethylhexyl ester 2,3,4,5- tetrabromobenzoate (TBB); 1,2- Ethylhexyl 3,4,5,6-tetrabromo-benzenedicarboxylate, or (2-ethylhexyl)-3,4,5,6 tetrabromophthalate (TBPH); Tris(2-chloroethyl) phosphate (TCEP); and Hexabromocyclododecane (HBCD). The EPA will utilize a new structure based approach, grouping chemicals with similar characteristics together with the chemicals targeted for full assessment under the TSCA Workplan. The review of similar chemicals in related groupings, and the environmental fate investigations for other chemicals, complements the risk assessments by focusing the identification of data needs on chemical classes with members that rank high for specific criteria in the Work Plan methodology, but lack sufficient data to conduct risk assessment. The EPA will use the information from these assessments to better understand the other chemicals in the group, which currently lack sufficient data for a full risk assessment. The agency will also begin environmental fate investigations of eight additional flame retardant chemicals that rank high for persistence, bioaccumulation and/or exposure potential, but for which there are not adequate data to conduct risk assessments.

Boxer 4. Please describe how the existing TSCA assessment process fails to identify chemical hazards and how TSCA reform will allow EPA to identify such persistent, bioaccumulative and toxic chemicals before they commercialized and allow EPA to take effective action after such chemicals are in commerce, when needed.

Answer: For new chemicals, TSCA requires that they must go through a pre-manufacture review at the EPA 90 days prior to commencing manufacture. The required notification provides the EPA with the opportunity to evaluate the chemical and, if necessary, to impose restrictions on activities that give rise to human health or environmental risk or exposure concerns before they occur.

As stated in the response to question 3 above, TSCA does not have a mandatory program where the EPA must conduct a review to determine the safety of existing chemicals. The statute places challenging legal and procedural requirements on the EPA before the agency can request the generation and submission of any health and environmental effects data on existing chemicals. As the EPA explained in its announcement of Essential Principles for Reform of Chemicals Management Legislation,[8] all chemicals should be reviewed against a science based safety standard that reflects risk based criteria protective of human health and the environment, including the health of children and other vulnerable populations, and, manufacturers should be required to provide the EPA with the necessary information to conclude that new and existing chemicals are safe. When manufacturers do not submit sufficient information, the EPA should have the necessary authority and tools to quickly and efficiently require testing or obtain other information from manufacturers that is relevant to determining the safety of chemicals. The EPA

[6] U.S. EPA, Significant New Use and Test Rules: Certain Polybrominated Diphenylethers, 2012. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2010-1039-0001.
[7] U.S. EPA, http://www.epa.gov/dfe/alternative_assessments.html.
[8] http://www.epa.gov/oppt/existingchemicals/pubs/principles.html

should also have clear authority to take risk management actions when chemicals do not meet the safety standard, with flexibility to take into account a range of considerations.

Boxer 5. The National Academy of Sciences (NAS) published "Science and Decisions: Advancing Risk Assessment" in 2009, which recommended several actions that EPA should take to modernize its approach to assessing chemicals' risks to human health, including for infants and children. For each of the recommendations below, list and describe the specific activities that EPA has ongoing or plans to take, including timelines for completing such actions, in order to fully implement the recommendations.

5a. NAS recommendations for EPA to modernize its methodology for assessing chemical risks, including:

i. Revising its default assumptions on the risks posed by chemicals;
ii. Developing explicit defaults about chemical risks, including for cancer and some non-cancer health effects, rather than continuing to use more informal approaches for approximating such risks (such as using "implied" defaults); and
iii. Over a two-to-five year period, developing clear criteria on the information needed to justify the use of alternative risk assumptions, rather than explicitly-stated risk defaults for chemicals.

Answer: EPA's Science and Technology Policy Council (STPC)[9] recently established the NRC Risk Assessment Reports Workgroup to address the NRC recommendations from four recent NRC reports: "Science and Decisions: Advancing Risk Assessment", "Phthalates and Cumulative Risk Assessment", "Toxicity Testing in the 21st Century", and "Exposure Science in the 21st Century: A Vision and A Strategy". This workgroup is charged with developing options and recommendations to the STPC and the EPA Science Advisor on additional steps that could be taken by the Agency to address recommendations from the relevant NRC reports, and with reviewing communications materials and summaries regarding the progress to date on incorporating the NRC recommendations into the EPA activities, including these to be sent to the SEPW.

The EPA policies regarding the current use of defaults are described in several agency documents. For example, the "Guidelines for Carcinogen Risk Assessment"[10] explain that the assessor must critically analyze the available relevant information before using a default to address uncertainty in the absence of critical information.

The EPA continues to evaluate the National Research Council (NRC) recommendations on the use of defaults and will develop additional guidance as necessary to incorporate new methods into agency practice. Concurrently, the EPA released the draft "Guidance for Applying Quantitative Data to Develop Data-Derived Extrapolation Factors for Interspecies and Intraspecies Extrapolation"[11] in 2011. This document outlines approaches for using data to develop factors to compensate for uncertainties in extrapolating from animal toxicity studies to humans and to address human variability. The external review draft is publically available and is expected to be released in final form in 2013.

[9] U.S. EPA, Science and Technology Policy Council, http://www.epa.gov/stpc/.
[10] U.S. EPA, Guidelines for Carcinogen Risk Assessment (2005), U.S. Environmental Protection Agency, Washington, DC, EPA/630/P-03/001F, 2005, http://www.epa.gov/cancerguidelines.
[11] U.S. EPA, External Review Draft of the Guidance for Applying Quantitative Data to Develop Data-Derived Extrapolation Factors for Interspecies and Intraspecies Extrapolation, U.S. Environmental Protection Agency, Washington, DC, EPA/100/J-11/001, 2011, http://www.epa.gov/osa/raf/ddefreview.htm.

The NRC highlighted an issue they termed "missing defaults", i.e., understanding risk only for those chemicals with a robust toxicity database. Through its Chemical Safety for Sustainability (CSS)[12] and Human Health Risk Assessment (HHRA)[13] research programs, the EPA is developing new methods and databases to assess chemicals with limited traditional toxicity data. Consistent with science and decisions as well as the recommendations from the 2007 NRC report, "Toxicity Testing in the 21st Century: A Vision and A Strategy," the ultimate goal is to compile all available chemical information and data, including chemical screening data generated from innovative chemical evaluation methods, into one accessible online application that interested users can access and select chemicals and data of interest in order to make informed decisions about chemical risks. CSS is building these accessible online applications using data generated from these innovative chemical screening methods that can be used to understand how chemicals perturb pathways that potentially lead to adverse effects. This will help reduce uncertainty related to species specificity, lifestage susceptibility, and dose response characterization, and allow the EPA to focus resources on those chemicals and endpoints of highest concern. The methods and databases developed through these efforts will be made publically available.

Likewise, through the HHRA research program, building from and expanding upon approaches used to develop Integrated Science Assessments, the EPA is addressing the NRC recommendations and applying new approaches to Integrated Risk Information System (IRIS) assessments, including increased transparency regarding alternative risk methodologies.

One example of a product resulting from these efforts is the Aggregated Computational Toxicology Online Resource,[14] a web based application that provides public access to more than 1,000 public sources of information on more than 500,000 environmental chemicals, 30 years worth of animal toxicity testing data, innovative chemical screening (called high-throughput data) from over 1,000 chemicals tested in more than 650 different tests, chemical structure information for 8,000 chemicals and chemical exposure predictions. Additionally, the EPA and several other federal agencies initiated the Toxicity Testing in the 21st Century (Tox21) collaboration,[15] which will use robotics technology to screen 8,000 chemicals for potential toxicity, and will continue to improve models for predicting both hazard (ToxCastDB[16]) and exposure (ExpoCastDB[17]). These projects will provide screening level data and methods on thousands of chemicals that do not have robust traditional toxicity and exposure datasets, which will inform the risk assessment of these chemicals.

5b. NAS recommendations for EPA to modernize its methodology for assessing non-cancer health effects, including:

i. Over the short-term, using contemporary methods ("probabilistic methods) for determining health effects from low-dose exposure to chemicals; considering factors such as vulnerable populations, background exposures to chemicals, the impact of existing disease burdens in people, as well as developing default risk estimates and guidance on the consideration of such factors; and using information and estimates of human susceptibility to cancer; and
ii. Over the long-term, better understanding the occurrence of human vulnerability and susceptibility to chemicals by expanding the Agency's research on such issues, and better

[12] U.S. EPA, Chemical Safety for Sustainability, http://www.epa.gov/research/progressreport/chemical.htm.
[13] U.S. EPA, Human Health Risk Assessment, http://www.epa.gov/research/progressreport/humanhealth.htm.
[14] U.S. EPA, Aggregated Computational Toxicology Online Resource, http://www.epa.gov/ncct/actor/.
[15] NIH, Toxicology in the 21st Century, http://www.ncats.nih.gov/research/reengineering/tox21/tox21.html.
[16] U.S. EPA, ToxCast Database, http://www.epa.gov/ncct/toxcast.
[17] U.S. EPA, ExpoCastDB: Exposure Forecaster Database, http://www.epa.gov/ncct/expocast/.

understanding how multiple chemical exposures can add together to harm human health by researching the interaction of chemicals that can have the same type of toxic impact, but have potentially different ways of causing such harm.

Answer: The EPA recognizes that addressing background in dose-response and exposure assessment is a complex issue. When data are available, the agency considers both background exposures (in the environment and within the body) in dose response analysis, and background incidence of disease processes in characterizing susceptibility and variability in human response. In Integrated Risk Information System (IRIS) assessments, multiple sources of background data are discussed and considered when they occur: endogenous background (produced within the body), anthropogenic (man-made) and natural background as it pertains to dose-response, and background exposure to essential nutrients/trace metals. In addition, the Integrated Science Assessments of ozone[18], carbon monoxide[19], and particulate matter[20] consider background disease processes such as asthma in evaluating susceptibility and human vulnerability.

The EPA is also developing a cumulative health assessment for six phthalates that cause a common health endpoint (male developmental/reproductive outcomes): butyl benzyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP), diisononyl phthalate (DINP), di(2-ethylhexyl) phthalate (DEHP), and dipentyl phthalate (DPP). This cumulative assessment may serve as a future framework for evaluating other groups of compounds that cause similar adverse outcomes.

The EPA's Risk Assessment Forum, under the oversight of the agency's Science and Technology Policy Council, has been charged with developing Guidelines for Cumulative Risk Assessment (CRA). Previously, the forum developed a "Framework for Cumulative Risk Assessment[21] published in 2003. Since then, the EPA conducted three workshops and prepared several white papers. Additionally, a series of case studies focusing on CRA issues and methods was developed for internal use to inform development of the CRA Guidelines. Draft CRA Guidelines for internal review are anticipated in 2013, followed by external peer review in 2014.

Probabilistic risk analysis (PRA) plays an increasingly important role in agency risk assessments since the 1997 EPA publication, "Guiding Principles for Monte-Carlo Analysis."[22] It was also a major focus in an associated review of the EPA practices by the agency's Science Advisory Board in September 2006.[23] The importance of using PRA is reflected by a number of advisory scientific panels and is an integral part of the EPA guidelines. The Risk Assessment Forum is developing two white papers that examine the use of probabilistic approaches in agency risk assessment and risk management. The papers provide a general overview of the value of probabilistic analyses and similar or related methods, and

[18] U.S. EPA, Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Second External Review Draft), U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/076B, 2011, http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=242490.
[19] U.S. EPA Integrated Science Assessment for Carbon Monoxide, U.S. Environmental Protection Agency, Research Triangle Park, NC, EPA/600/R-09/019F, 2010, http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=218686.
[20] U.S. EPA, Integrated Science Assessment for Particulate Matter, U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F, 2009, http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546.
[21] U.S. EPA. Framework for Cumulative Risk Assessment. U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment, Washington Office, Washington, DC, EPA/600/P-02/001F, 2003, http://www.epa.gov/raf/publications/framework-cra.htm.
[22] U.S. EPA. Guiding Principles for Monte Carlo Analysis. U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC, EPA/630/R-97/001, 1997, http://www.epa.gov/raf/publications/guiding-monte-carlo-analysis.htm.
[23] U.S. EPA SAB, Consultation on Enhancing Risk Assessment Practices and Updating EPA's Exposure Guidelines, February 28, 2007, http://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/55E1B2C78C6085EB8525729C00573A3E/$File/sab-07-003.pdf.

case studies of current applications across the agency are also included. The external review draft is publically available[24] and expected to be released in final form in 2013.

[24] U.S. EPA, Two External Review Drafts on Probabilistic Risk Assessment, http://www.epa.gov/raf/prawhitepaper/index.htm

Senator BOXER. Thank you very much.

I just wanted to make a note here that I am a very strong supporter of bipartisanship, and this Committee has shown we can do it. And we are very proud of our accomplishments.

But there are certain times when it does not work, and as Chairman of this Committee, I am responsible for saying we should mark up a bill, and I take all the heat for that. It is not Senator Lautenberg, but I found out from him that he had dozens of meetings, and he just believes at this point that there is a breakdown, there is a difference.

There is a difference here which involves how much you want to protect public health versus how much you want to balance that with protecting chemical companies. Now, that is his view on the thing.

And I think at some point we might have to say that we have gone very far in our talks, everyone is friendly and amiable, and I really appreciate that as Chairman. But at some point there are going to be issues where there are just clear differences. And I do not think that is anything to be ashamed of. I think the people of this country need to understand the differences. There is nothing wrong with that. So we are going to move ahead.

But I was also heartened to hear Senator Vitter say, and others, that they are going to continue to work with us because, if we do get this bill out, we do not know, if we do get this bill out, and it is ready for the floor, we are still open. I know Senator Lautenberg is still open to negotiations. So, I wanted to make that point.

I want to ask my first question this way, Administrator Jones. Your testimony states that EPA is concerned that certain flame retardants called PBDEs are persistent, bioaccumulative, and toxic to humans and the environment and that their potential impacts on neurobehavioral development raise particular concerns for the health of our children. Can you explain why these types of persistent and bioaccumulative chemicals can raise unique threats to children's health?

Mr. JONES. Thank you, Senator Boxer. These compounds, PBDEs in particular, express toxicity in developing organisms, and we learned that about a dozen years ago through some data associated with developing organisms, development neurotoxicity studies. So, they affect the development of growing organisms, so, children in utero.

But the fact that they are persistent and bioaccumulative creates additional concerns because they are going to last in the environment for a very long time. So, even after they are removed from the market, they are going to be in our environment for some time, and they are going to move up the food chain. So, that creates a different route of exposure to humans, not only from your exposure directly to such a chemical but also indirectly as they will get into the environment and move up the food chain. So, they will ultimately end up in foods that we consume.

Senator BOXER. Well, I wanted to make a point that a study by researchers at UC, University of California San Francisco, detected certain PBDEs, PCBs, pthalates, pesticides, perchlorate, and other chemicals in the blood of 99 to 100 percent of pregnant women that they tested. So, our society is being exposed to these chemicals and

the most vulnerable, the fetuses, are getting exposed. And it is very serious.

So I know, as we look at history, that TSCA needs to be reformed. I think everybody agrees with this. So, my question to you is, could you describe the additional tools to protect the health of pregnant women, infants, and children that reforming TSCA would provide to the EPA? In other words, what would it give you if it was done right that you cannot do now?

Mr. JONES. Thank you, Senator Boxer. The things that we would hope to achieve as articulated in the Administration principles are that we would have, the manufacturers would be able to demonstrate the safety of compounds such as these before they are on the market, the agency would have tools for those chemicals that are on the market to quickly get health and safety information from manufacturers, and then the agency would have the tools it would need when we identify a risk to manage or mitigate the risks associated with those chemicals that are on the market.

Senator BOXER. OK. Well, let me, I will just make a final comment and then pass it on to Ranking Member Inhofe.

What you said is really key. I would bet that if we went outside and just asked anybody walking by if they thought that chemical companies have to do tests and prove the chemicals safe before it is used people would say of course. They would think that would be the case, that a chemical has to be proven safe before it is used. In actuality, under the law currently, the EPA has to prove it unsafe. Is that correct?

Mr. JONES. That is correct, Senator.

Senator BOXER. OK. So, what Senator Lautenberg is doing, which I so strongly support, is he is doing the common sense thing. He is saying, chemical companies, make sure your product is safe. Let us not have a series of disasters, cancers, all kinds of problems, after you introduce a new chemical. Prove it safe first. And then that would turn this thing around to a place that I think the people of America already believe is the case.

So, thank you very much.

Senator Inhofe.

Senator INHOFE. Thank you, Madam Chairman.

Perhaps Mr. Jones, because of my position on the Armed Services Committee, I have gotten a lot of concerns expressed as those were expressed in the letter that I made a part of the record. And in your April 2nd report it says downstream users believe that there will continue to be critical military and aeronautical uses of Deca-BDE after December 31, 2013.

Now, I would like to ask you, did EPA actually consult these people prior to—at any time during this process? And if so, what will you be doing after this point, say this thing passes?

Mr. JONES. Thanks, Senator Inhofe. So, you are referring to the phase-out of Deca-BDE, which becomes effective at the end of 2013. The agency is working with aircraft manufacturers as well as the Department of Defense to make sure that we fully understand their need for flame retardancy in aircraft, which we think it is very important that aircrafts are safe from fires, as you referenced in your testimony. And so, we are going to continue to work with

DOD and the aircraft manufacturers to make sure they have the tools to ensure that.

Senator INHOFE. That is good. Let me just ask you, if you would do for the record and have it—so that we will have it writing and give me a chance to look at it, would you read the two documents that I made as a part of the record and respond to those documents for me as to your feelings, of you and the EPA?

Mr. JONES. Absolutely, sir.

Senator INHOFE. The other thing I wanted to ask you, to better understand where the EPA is on this, have you formally taken a position on the Lautenberg legislation?

Mr. JONES. The Administration and myself, as part of that, have not taken a position on Senator Lautenberg's bill.

Senator INHOFE. OK. And have you provided policy advice or technical support to Senator Lautenberg about the latest revisions?

Mr. JONES. My staff has been providing technical support to Senator Lautenberg for actually a number of years.

Senator INHOFE. All right. And have you done any sort of review or analysis of S. 847, internally or for other purposes? And if so, could we be provided with that information?

Mr. JONES. Simply technical analysis as opposed to any kind of policy analysis.

Senator INHOFE. All right. Internally?

Mr. JONES. Yes, that is right, provided to Senator Lautenberg's staff.

Senator INHOFE. I see. All right. Thank you very much.

Thank you, Madam Chairman.

Senator BOXER. Thank you very much, Senator.

Senator Lautenberg.

Senator LAUTENBERG. Thank you. We have looked at these things and tried to evaluate where we are. I never liked this thing.

[Laughter.]

Senator BOXER. We need to hear you.

Senator LAUTENBERG. I will shout.

[Laughter.]

Senator LAUTENBERG. I mentioned that Senator Snowe and I recently sent a letter to the EPA, signed by 24 of our Senate colleagues, applauding EPA's current actions on flame retardants. The letter also expressed concern that EPA's authority to address these toxic flame retardants is limited under our current chemical safety law, the Toxic Substances Control Act.

Does EPA's limited authority under TSCA prevent the agency from providing the kind of protection that Americans want for their health risks of flame retardants?

Mr. JONES. Thanks, Senator Lautenberg. I believe that it does. As I stated this morning and at other hearings, the burden is on the EPA to determine that these products are not safe. So, had we the authority to insist that the manufacturers demonstrate safety before they are on the market, I think it would significantly increase our confidence and the American public's confidence that these products that are on the market are safe.

Senator LAUTENBERG. Americans have among the highest blood concentrations of chemicals in the world. How does EPA's legal authority to address risk from industrial chemicals compare to au-

thority on other countries, the Euro countries and other countries around, our neighbor, Canada? How do we compare with our maintenance of the best protections that we can develop compared to these countries?

Mr. JONES. Thank you, Senator. Without at all making comparisons about the adequacy of other countries systems, it is pretty clear that Canada and the European Union have significantly more robust processes in place. They generally require the generation of health and safety data for chemicals that are sold on the market.

Senator LAUTENBERG. Chemicals that are manufactured in the European Union? And the significance?

Mr. JONES. As long as, if it sold in the European Union, whether is it manufactured there or not, the generation of health and safety data.

Senator LAUTENBERG. The EPA has determined that PBDE flame retardants, and you said this, may be persistent, bioaccumulative, and toxic to both humans and the environment. What can we do to help those who are—have signs of the chemicals in their bodies at this point? We know that there is an effect that is negative on pregnancies. Is there anything that we can do to help ameliorate the conditions that these people find themselves in?

Mr. JONES. Well, I think the most important thing we can do is what has happened and to keep that, the direction it is going in, the right direction, which is that those chemicals have been removed from the market. We are fortunate that the manufacturers of them have voluntarily agreed to remove them from the market. And so one of the things that we are doing to backstop that is to put in place a significant new use rule which should keep other manufacturers who may not have voluntarily agreed to such restrictions from entering the market without coming to the agency first where we would have to do a complete assessment.

Senator LAUTENBERG. So, it is fairly obvious then, Mr. Jones, is it not, that companies realize a that there is a risk to people in our society from exposure to these chemicals, and second, is there not, in your judgment—and if I am stretching you, please say so—that to assume that the manufacturers would welcome an opportunity to have a uniform standard across the country that, so that there are a continuum of State decisions that may vary from State to State?

Mr. JONES. As a general matter, I have learned over my career not to try to speculate into what goes on in the minds of——

Senator LAUTENBERG. Oh, that is too bad.

Mr. JONES. But I will say in conversations I have had with manufacturers they are struggling with the patchwork of regulations that is developing in the United States.

Senator LAUTENBERG. Thank you.

Senator BOXER. Thank you.

Senator Crapo.

Senator CRAPO. Thank you, Madam Chairman.

Mr. Jones, I would like to ask first a couple of questions to you about EPA's position on Senate Bill 847. In your testimony at the Appropriations Subcommittee at which you testified last week, it seemed that you endorsed Senate Bill 847 through your comments but did not use the specific words of support or endorsement. And

for that reason, I think we need to clarify where the EPA and the Administration stand on the bill. Can you tell us whether the EPA has, in fact, take a formal position on Senate Bill 847?

Mr. JONES. Senator Crapo, thanks for the question. The EPA, nor the Administration, has not taken a position on Senator Lautenberg's bill.

Senator CRAPO. Does the Administration plan to do so at any time soon?

Mr. JONES. I am not aware of any plans for a statement of an Administration position on that bill at this time.

Senator CRAPO. Has the Administration convened an interagency review of the legislation? Or do you know if that is intended to take place?

Mr. JONES. The Administration has not convened such a group.

Senator CRAPO. All right. Thank you.

Also, just to move on to another topic, at your testimony last week before the Senate Appropriations Committee hearing, you stated that the EPA might have made a different pre-manufacturing notice determination in 1995 about the new flame retardant chemicals if TSCA has required the submission of more robust hazard exposure and use data to assess their risks.

Can you explain to me a little more specifically what you referred to there that could have been provided but was not allowed to be sought under current statutory authorities?

Mr. JONES. Sir, as I mentioned, the burden is on the agency to determine whether or not we think a new chemical meets the standard. And because we did not have data on the persistence of the bioaccumulation, we were using models that we had to try to estimate that. Unfortunately, for those particular compounds those models proved to be ineffective, so they did not flag the persistence and the bioaccumulation of the chemical.

As a general matter, for chemicals coming in that are new that are persistent and bioaccumulative, because those two features tend to create problems over time, we insist on a much more robust health and safety testing. So, had we known they were persistent and bioaccumulative, we would have required the manufacturer—we would likely have required the manufacturer to generate health and safety data before entering the marketplace.

Senator CRAPO. But you had no authority to obtain that information?

Mr. JONES. We did, but as I said, if we do not know of the persistence and the bioaccumulation, and in this case our models were not good at predicting it, we did not because the practice was if you do not have persistence or bioaccumulation we are not going to insist on the generation of that data.

Senator CRAPO. So, if the models were defective and did not tell you the information you should be seeking, but you did have statutory authority to obtain that information had you known, is it not a problem with the models?

Mr. JONES. Well, one could say it is a problem with the overall structure. If the models are failing us across the board, that would put us in the position of requiring everyone to generate health and safety data before they are on the market.

Senator CRAPO. So, what, I guess what I am trying to get at is what do we need to do statutorily to fix that problem?

Mr. JONES. We think that the statute needs to turn the burden around for the manufacturer to provide the agency the information necessary to demonstrate safety of the compound. And there are plenty of ways that can be done. Generally understanding characteristics like persistence, bioaccumulation, and toxicity is a key part of that.

Senator CRAPO. TSCA Section 7 provides EPA the authority to regulate imminent hazards caused by chemical substances. Do you agree that is a pretty broad authority under Section 7?

Mr. JONES. I have to admit, Senator Crapo, I have not spent much time with Section 7 in my tenure at EPA. So I do not feel prepared to answer that.

Senator CRAPO. OK. As I review it, it appears that it is a pretty broad authority, and I am not aware of whether the EPA has ever even exercised its Section 7 authority. Again, I am getting at the question of what authorities the EPA does have now to achieve the necessary evaluation that you describe. So I would appreciate it if you would provide me with further information after you meet back with your staff.

Mr. JONES. Sure. I would be happy to.

Senator CRAPO. That is all I have, Mr. Chairman.

Senator LAUTENBERG [presiding]. Senator Merkley.

Senator MERKLEY. Thank you very much, Senator Lautenberg. And I must say that I was very struck by the Chicago Tribune story that laid out a history in which it noted that use of these flame retardants really gained steam when the cigarette industry was looking to provide an alternative focus for the public in terms of home fires and get away from the cigarette in the sofa explanation. Then, after the retardants started to become widely used, of course, those who make the retardants enjoyed the possibility of continuing to promote their use by engaging in kind of very dramatic testimony about children dying in fires.

And what this article in the Tribune speaks to is that, and I will just quote the first paragraph or couple of paragraphs here, before California lawmakers last year, the 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 the baby's size, approximately the baby's size, half of her body was severely burned, she ultimately died after about 3 weeks of pain and misery in the hospital. His passionate testimony about the baby's death made the long-term health concerns about flame retardants voiced by doctors and environmentalists and firefighters sound abstract and petty.

But there was a problem with this testimony. It was not true. Records show that there was no dangerous pillow or candle fire. The baby he described did not 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 that he told Alaska lawmakers was fatally burned in a 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 decade's long campaign of deception that has loaded the furniture and electronics in American homes with pounds of toxic chemicals linked to cancer, neurological defects, developmental problems, and impaired fertility.

Then the article goes on to note that the industry often points to a Government study from the 1980s as proof that flame retardants save lives. But the study's lead author, Mr. Babrauskas, said in an interview that the industry has distorted his findings and that the amount of retardants used in household furniture does not work. The fire just laughs at it, he said.

So, here we have kind of testimony that the retardants do not work, testimony that the retardants cause all of these other kinds of problems, testimony that the amount in the American baby has doubled roughly every 2 to 5 years since—I believe it was since 1980. Is this not exactly the type of problem that the EPA is there to watch for? And I just heard you testify that we did not look into it, and yet we have these blood studies that show that it was doubling every couple of years in the body. Certainly, that must speak to the bioaccumulative presence.

Has the EPA been asleep at the switch, and has it woken up?

Mr. JONES. Thanks, Senator Merkley. As I mentioned earlier today, one of the major classes of flame retardants, PBDEs, have been phased out in the United States. There is one last chemical that is at the end game of its being phased out. But that was done through a voluntary agreement with the manufacturer for a couple of reasons. One is that it was very hard for us to get the health and safety data that we needed to evaluate those compounds. And then, taking a chemical off the market under TSCA has proven to be incredibly difficult for the Government. We were fortunate in this case that the manufacturers were willing to take those compounds off the market.

There are a number of other flame retardants that are on the market, and we are going to begin to assess their safety in the next fiscal year, 2013, including two of the flame retardants mentioned in the Chicago Tribune story. So EPA has not been living up to, I think, what the American public expects, but I think a good part of that has to do with the challenges that the Toxic Substances Control Act creates for us.

Senator MERKLEY. When you said that several had been phased out, there are several different versions of this, the Octa version and the Deca version. Is that what you are speaking to? These different versions?

Mr. JONES. Penta and Octa have been phased out. Deca is in the end of its phase-out right now.

Senator MERKLEY. One of the things that is pointed out is that infants are particularly susceptible to this because they are crawling around on the carpet, and the carpet collects the dust from various products that have this as well as some of the carpets themselves have it in it. And so a child being very close to the carpet, playing on the carpet, breathing inches away from the carpet, is far more exposed than an adult. Is this an issue that you have studied and looked into?

Mr. JONES. Ultimately the assessments that we do for these compounds are going to include that route of exposure that you have described which is that the compound often either leaches out or from rubbing comes off of the originally treated material and ends up in house dust and often can end up in carpet or on floors and thus lead to a hand-mouth exposure.

Senator MERKLEY. Thank you.

Senator BOXER. Thank you, Senator.

Senator Vitter.

Senator VITTER. Thank you, Madam Chair, and thank you, Administrator Jones.

As I mentioned in my opening statement, I think a big hurdle we face in this area generally is a dramatic erosion of broad-based confidence over several years in the science agencies like EPA uses. And I mention as a prime example of that this NAS study that underscored the inadequacy of that science. And it implicated pretty broadly the IRIS process. And as I also said, the EPA essentially acknowledged this and through Dr. Paul Anastas committed to major core reforms to address that in the IRIS process.

Since then, what are the major core reforms to the IRIS process that have been implemented by the EPA? What are they, and how do they address these concerns and this erosion of confidence?

Mr. JONES. Thanks, Senator Vitter. The principal reform that the agency has already embraced is increasing the public participation associated with IRIS reviews. Internally, we are also broadening the offices outside of ORD that participate in IRIS assessments. You may or may not know that the Office of Research and Development manages the IRIS process as opposed to my office.

Senator VITTER. I am aware of that. But go back to the first thing you said. Public participation. What do you mean by that? How does that attack the problems I cited?

Mr. JONES. Transparency has been one of the tools the agency has long relied on to ensure the integrity of our scientific processes. And so allowing people who are not employees of the agency to look at our work and give us their feedback we have found to be a very effective means to ensuring the integrity of our science processes.

Senator VITTER. So, you are talking about peer review?

Mr. JONES. Both peer review as well as just broad public comment.

Senator VITTER. And what truly independent peer review is now mandated in the IRIS process?

Mr. JONES. I am not familiar with the specific requirements that the IRIS program has put in place for independent peer review. We are—the compounds that our offices work with them on have all had internal peer reviews associated with them.

Senator VITTER. OK. Well, let me just underscore that a lot of folks would not consider that robust and adequate. Usually, peer review means very independent peer review, clearly outside the academic institution or the agency that something is emanating from.

Also related to this, as you know, the last omnibus appropriation bill mandated further reviews by National Academy of Sciences about this further contracts. Can you tell us the status of those NAS reviews and contracts?

Mr. JONES. I am not familiar, Senator Vitter, with the status of contracts related to the appropriations requirements.

Senator VITTER. OK. If you can have someone follow up and add that to the testimony because that goes directly to my concerns? Thank you.

Senator BOXER. Colleagues, we have been joined by two colleagues. I think we are going to move to the panel, and then I will call on Senator Carper first, then Senator Cardin, then we will go back and forth.

Is that OK with you, Senator Vitter?

Senator VITTER. Yes.

Senator BOXER. OK. Thank you. So, we thank you very much.

We are very honored to call forth panel No. 2. Hannah Pingree, a Former Speaker of the Main House of Representatives, speaking to us as a mom. She will discuss State efforts to ban certain flame retardant chemicals. Dr. Heather Stapleton, Assistant Professor of Environment Chemistry at the Nicholas School of the Environment at Duke. She will discuss the science on the health effects of certain flame retardants. Those are both majority witnesses.

Two minority witnesses. Marshall Moore, Director, Technology, Advocacy and Marketing, Great Lakes Solutions, a Chemtura business. They will speak about chemicals, including flame retardants. William Rawson, another minority witness, Partner, Chair, Environment, Land and Resources Department, Latham & Watkins, attorney for chemical manufacturers including of flame retardants.

And Tony Stefani, President, Founder, San Francisco Firefighters Cancer Prevention Foundation. This is a majority witness, and I am proud, a Californian, who is a cancer survivor. He will discuss local efforts to help firefighters who are exposed to chemicals during and after fires, including with medical monitoring.

We are going to start with Hannah Pingree. We welcome you.

STATEMENT OF HANNAH PINGREE, MOTHER, FORMER SPEAKER OF THE MAINE HOUSE OF REPRESENTATIVES

Ms. PINGREE. Chairwoman Boxer, Senator Lautenberg, Ranking Member Inhofe, and members of the Committee, my name is Hannah Pingree, and I thank you for this invitation.

I am here as the Former Speaker of the Maine House. I am also here as the mother of a young daughter, and I am 6 months pregnant. I am here on my own behalf, but I also work as a consultant for Safer Chemicals, Healthy Families, the national coalition working to protect our kids from the health impacts of toxic chemicals.

I have been involved in chemical regulation issues for nearly 10 years as a legislator and advocate. But today, as a parent, I am more concerned than ever about the current state of chemicals in our products.

Today we know that the umbilical cord blood of every American pregnant woman tested shows multiple chemicals such that our babies are born into this world with toxins in their bodies that we know can harm their health and their development.

At the age of 30, I participated in a study of 13 Maine people called Body of Evidence in which I was tested for 71 chemicals. I had the second highest levels of phthalates and mercury in our study. My mercury levels were above the safety standard for pro-

tection of a developing fetus, and I had levels of flame retardants, arsenic, PFCs, and BPA. They were all cause for concern. As a lifelong resident of a small, offshore island with no major industry or pollution, without a doubt the chemicals in me came from products in my home and the food that I eat.

These results also arrived in the midst of our Maine legislative work to ban flame retardants in which experts from the industry told us that these toxins do not buildup in people's bodies above the safety threshold. Our study suggested that they were wrong.

Because of the failure of TSCA to regulate thousands of chemicals in our products, States across the country have been forced to step in to protect public health. Since 2003 more than 150 policies in 30 States have been passed to limit exposure to toxic chemicals. The vast majority of these laws were passed with overwhelming majorities of Democratic and Republican legislators and Governors.

Across the country, lawmakers experiences with the chemical industry in passing these laws echoed those detailed in the spring Chicago Tribune exposé which revealed a pattern of unethical behavior. Legislators were misled and even lied to about the health impact of chemicals and the ability of flame retardants to prevent fires.

In Maine, I sponsored successful bills to ban brominated flame retardants, known as PBDEs, in both 2004 and 2007. In our first interactions with industry, their concerns, their experts argued that these chemicals were safe and that our health concerns were alarmist. Today we know that these flame retardants are associated in delays with brain impacts in kids, reproductive problems, and cancer risks. A new study just released has linked exposure to these chemicals during pregnancy with increased autism risk.

In 2007 I brought forward a phase-out of the flame retardant Deca used in everything from TVs to mattresses to upholstery. The bill attracted more money and deception than any other piece of legislation during my tenure in the House. The chemical industry paid for weeks of TV and newspaper ads as well as radio, mail, and robo-calls. Their front group, called Keep America Fire-Safe, paid for ads that claimed that Maine legislators were seeking to weaken fire safety accompanied by B-roll of a burning house.

Despite their campaign, few Mainers contacted us. And despite their name, the industry had no support from fire safety groups. Both the Maine fire chiefs and our firefighters union were among our most passionate supporters.

The industry flew in a man for the public hearing who had been seriously burned as a child. When questioned by committee members, he admitted that his burns were not caused by a lack of flame retardants and that he was a paid witness for the industry. Their goal was only to mislead and to shock. Luckily, those tactics were offensive to Maine legislators. In the end, the Deca ban was supported by unanimous vote in the House and the 32 to 2 vote in the Senate and signed by our Governor.

We learned in Maine and repeatedly across the country that this industry's primary tactic is to deny and mislead, hide health information, and then agree to voluntary phase-out of the chemical. The industry, after denying any health concerns in Maine in 2007,

agreed in 2009 to a U.S. phase-out of Deca for virtually all consumer uses.

The challenge of sorting out chemicals in our products is overwhelming as a parent. Before my daughter was born, my husband and I researched crib mattresses, and after reading countless Web sites and blogs, we spent a couple of hundred extra dollars for a mattress free of flame retardants. Keeping a child safe in their bed should not take extra research or money.

Despite our decision to buy a green mattress, we still have our old couch in the living room and our mattress in our bed, both likely treated with several pounds of flame retardants each. Whether it is our couches, our kids toys, our car seats, there is no required disclosure or warning signs about chemicals and their health impacts. And that is why we moms and parents across the country need leadership from you, our Federal leaders. We need safe products for our kids and our families.

In closing, I want to thank Senator Lautenberg for championing the Safe Chemicals Act, Senator Boxer for her leadership, and I want to thank my two Senators, Senators Snowe and Collins both for joining the bipartisan call for an overhaul of the nation's chemical safety laws.

The system has been ineffective since the passage of TSCA in 1976, the year I was born. I understand that this Committee will consider the Safe Chemicals Act tomorrow, and for the sake of my kids' health, your children and grandkids and millions across the country, I urge this Committee to take immediate action to remedy our broken system.

Thank you.

[The prepared statement of Ms. Pingree follows:]

STATEMENT OF HANNAH PINGREE TO THE U.S. SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE AND THE SUBCOMMITTEE ON SUPERFUND, TOXICS AND ENVIRONMENTAL HEALTH

HEARING: "OVERSIGHT OF THE EPA AUTHORITIES AND ACTIONS TO CONTROL EXPOSURES TO TOXIC CHEMICALS."

July 24, 2012

Chairwoman Boxer, Chairman Lautenberg, Ranking Members Inhofe and Crapo, and members of the committee, my name is Hannah Pingree, and I am honored to be here to testify on the issue of toxic chemical regulation—especially flame retardants—and our health.

I thank the leadership of this committee for bringing this important issue to light. I am here as the former Speaker of the Maine House, term limited as a state representative in 2010 after eight years of service. I am also here as the mother of a 16 month-old daughter and, as you might have noted, I am also 6 months pregnant with our second child. Lastly, while I am here on my own behalf, I also work part-time as a consultant for Safer Chemicals, Healthy Families, the national coalition working to improve our chemical safety laws and protect our kids and families from the health impacts of toxic chemicals.

I have been involved in toxic chemical regulation issues for nearly ten years as a legislator and advocate, but today—as a parent—I am more passionate and concerned than ever about the current state of chemical safety for my kids and millions of other kids across the country.

When I started working on this issue in 2004 as a young legislator, it took some complicated explanation of the issues to relay what I was working on to friends and family. Today, people I talk to understand this issue immediately, and they are outraged that nothing has been done to fix this problem. Moms hear about chemicals in their babies' products, in our food supply, and in our environment from television, magazines, and from friends. Public polls indicate that huge majorities of Americans agree that better regulation of toxic chemicals, especially for the sake of kids' health, is just common sense.

Today I want to bring you three messages—two from the perspective of a legislator, and one from my immediate vantage point as a new parent.

First, because of the failure of the federal Toxic Substance Control Act and the EPA to regulate chemicals in consumer products, states across the country have been forced to try to pick up the pieces of this complicated regulatory issue. As states, we have taken action in response to what we believe is an urgent threat to the health of children and families in our states.

Since 2003, 95 policies in 30 states have been enacted to limit the public's exposure to toxic chemicals. The vast majority of these policies were enacted with the support of significant majorities of both Democratic and Republican legislators and governors. The

states began with action to limit mercury and lead, and have since passed successful limits on brominated flame-retardants, phthalates, BPA, and cadmium. Bans on the chemical chlorinated-tris have also been proposed in several states, and a ban of chlorinated-tris in children's products was recently enacted in the New York Assembly. In the 2012 legislative sessions, 28 new state-level policies were introduced across the country in an attempt to limit toxic chemicals in consumer products.

California, Maine, Washington, and Minnesota have each passed more comprehensive bills that create broad state-level regulatory regimes or public-disclosure and listing requirements for those chemicals of highest concern for public health. Washington State's program issued a final rule in 2011 that listed 66 chemicals of concern and required children's product manufacturers to report on whether their products contain these chemicals by August 31, 2012. Once the product data is available, the Washington state legislature may consider bans or phase-outs of some of those chemicals of concern, in order to protect kids and vulnerable populations. Three weeks ago, my home state of Maine adopted a list of 49 Chemicals of High Concern. For two priority chemicals, Maine has already adopted regulations to require reporting, evaluate safer alternatives, or prohibit the sale of consumer products containing those chemicals.

The states have been important laboratories for democracy on this issue. The states have also worked to spur innovation, with green chemical incentives and research and development. The policies implemented across the states have attempted to fill the void left by the inaction of the federal government and the EPA. In the absence of federal protection from chemicals we know to be dangerous for human health, states have been forced to act.

The states will continue to work to innovate on this front, but—especially in this dire fiscal climate—state governments lack both the resources and the staff to do the kind of scientific work that is needed to fully regulate the vast inventory of chemicals used in commerce. That is why this hearing today is important, and real reform of the toxic substance control act—as outlined in the Safe Chemicals Act sponsored by Chairman Lautenberg—is so crucial.

Second, as a former state legislator, I am here to provide a first hand account of the actions of the chemical industry and its political allies. In Maine and in states across the country, legislators have observed and been the subject of repeated negative and deceptive campaigns to thwart common sense regulation of chemicals.

The *Chicago Tribune* series "Playing with Fire"[1] did an excellent job uncovering the over-the-top tactics of both the flame retardant industry and its front group, "Citizens for Fire Safety."

The striking facts and details uncovered by the *Chicago Tribune* investigation four-part investigation include:

- A decades long pattern by the chemical industry of denying basic health impacts of flame retardants, including their negative health consequences and the fact that they can build up in our bodies, despite clear scientific evidence to the contrary. The *Tribune* states: "A typical American baby is born with the highest recorded concentrations of flame retardants among infants in the world," and that, "blood

levels of widely used flame retardants doubled in adults every two to five years between 1970 and 2004."

- Chemical industry lobbyists, front groups, and paid witnesses who distorted and inflated information about the ability of certain flame retardants to prevent the spread of fires.
- Paid medical testimony to legislative committees about anecdotes involving fires and burn victims, including the testimony in numerous state legislatures of Dr. David Heimbach, who gave several varying graphic descriptions of babies who died after being burned in their cribs due to a lack of flame retardants. All of his medical testimony proved later to be fabricated, but at the time his testimony had enormous impacts on legislative committees. His appearances were paid for by "Citizens for Fire Safety".
- The chemical industry front group, "Citizens for Fire Safety" falsely claimed in California that the ban on fire retardants was a racial issue and that minority children in particular would "burn to death if flame retardants were removed from household products."
- The chemical industry recruited a tobacco industry lobbyist to engage the National Association of State Fire Marshals to hatch a successful plan to increase the required use of flame retardants to assist the US tobacco industry. At the time the tobacco industry was making an all out effort to avoid pending regulations requiring the tobacco industry to produce "fire-safety" cigarettes and they saw increasing the use of flame retardants as a potential solution, rather than changing their cigarettes.
- The *Tribune* writes about the increase in the use of flame retardants, largely due to government regulations (and lobbying efforts on the part of folks like the National Fire Marshals): "In the last quarter-century, worldwide demand for flame retardants has skyrocketed to 3.4 billion pounds in 2009 from 526 million pounds in 1983." In the typical American home, that translates into pounds of these chemicals in our furniture, mattresses, and electronics.

Legislators' experiences across the country echo those detailed in the *Chicago Tribune*. They have been misled and even lied to by the chemical industry about the health impacts of flame retardants and their ability to prevent fires. The chemical industry has repeatedly used false, misleading and over-the-top tactics to attempt to win. Today, I bring you a few more stories of the outrageous tactics of the chemical industry, their front group "Citizens for Fire Safety", and the American Chemistry Council, from Maine, Minnesota, and Alaska.

In Maine, we dealt first hand with denial of the basic science and health impacts of flame retardant chemicals, we encountered a front group that was the precursor to "Citizens for Fire Safety", and we heard from a burn victim who was paid by the chemical industry to appear before our legislature. And we faced a barrage of negative pressure on television, in full-page newspaper ads, and in our legislature from chemical industry lobbyists.

In Minnesota, the "Citizens for Fire Safety" group and its battery of lobbyists went so far as to distribute a false letter—purporting to be from a local county hospital burn center—opposing a flame-retardant ban on the floor of the House.

And in Alaska, the same Dr. Heimbach exposed in the *Chicago Tribune* series for his

paid testimony and lies in other states, convinced key legislators to oppose flame-retardant legislation. Dr. Heimbach's fabricated story, paid for by the chemical industry, ultimately thwarted Alaska's attempts at regulating this toxic flame retardant.

I am also submitting for the record several letters from state legislators around the country, firefighters, and health groups that echo this same message: We're tired of the misleading lobbying campaigns in the face of this dire threat to public health, and we're looking to you, our leaders, for federal reform of our current broken system of regulation.

MAINE:
Maine and Washington were among the first states to take aggressive action to limit the use of PBDE-flame retardants (polybrominated-diphenyl ethers), from 2003 through 2007. It was in these early years that we first saw the tactics of the flame retardant industry and its trade association, tactics that would later be repeated and intensified in other states. In Maine and Washington, the chemical industry started using paid front groups, spent aggressively on media to defeat state chemical regulation, honed its denial arguments, and—shortly after losing votes on flame retardant bans of Deca-BDE, in Washington and then Maine—changed the name of its industry front group and officially launched "Citizens for Fire Safety."

Specifically in Maine, I sponsored three different successful measures to limit brominated flame retardants known as PBDEs, and another more comprehensive chemical reform law called the "Kid Safe Products Act". All four measures were successful and signed into law, and each piece of legislation was the target of its own attack from the chemical industry, lobbyists, trade groups, and witnesses paid by the chemical lobby.

In 2004, we passed LD 1790: "An Act To Reduce Contamination of Breast Milk and the Environment from the Release of Brominated Chemicals in Consumer Products." The final law prohibited the sale of products, such as couches and chairs with foam cushions, containing the brominated flame retardants known as "Penta-BDE" and "Octa-BDE", and established a goal to phase out the flame-retardant "Deca-BDE" if safer alternatives were proven available. The bill was passed with an overwhelming bipartisan 125–6 margin in the Maine House, unanimously passed in the Senate, and signed by the Governor.

The second bill, in 2007, was LD 1658, "An Act To Protect Pregnant Women and Children from Toxic Chemicals Released into the Home", which phased out the use of the flame retardant Deca-BDE in consumer products, including televisions, computers, mattress pads, and residential upholstery. The legislation required a finding that safer alternatives or other means of preventing fire be available for the chemical to be phased out. The legislation was supported by a unanimous, 129–0 roll call in the House, a 32–2 vote in the Senate, and signed by the Governor.

Lastly, in 2010, we enacted LD 1568, "An Act to Clarify Maine's Phaseout of Polybrominated Diphenyl Ethers," which phased out new uses of Deca-BDE in plastic shipping pallets and established a presumption that other brominated or chlorinated flame retardants should be avoided as replacements. This law passed unanimously before being signed by the Governor.

In our first interactions with the flame retardant chemical industry, in 2004, a trade group

funded by the major flame retardant manufacturers called the Bromine and Science and Environmental Forum brought in paid consultants, scientists, and the head of the bromine chemical group from Belgium. They spent weeks before our Joint House and Senate Natural Resources Committee arguing that brominated flame retardant chemicals were safe and that those of us raising health concerns were simply alarmists. By that time, Europe was already starting to take action, restricting those same chemicals. In 2004, numerous studies had already shown negative health impacts, especially in children and developing fetuses.

In 2007, with support from the Maine Department of Environmental Protection, and after several years of study, we brought forward a phase-out of Deca-BDE in consumer products in the home. That bill attracted more out-of-state lobbying money and deceptive tactics than any other piece of pending legislation I worked on or observed during my entire eight years in the Maine House.

While Maine doesn't have disclosure laws that would allow us to understand the full magnitude of the spending against the bill, we know that the chemical industry hired many of the state's top paid lobbyists and public relations groups. They proceeded to pay for several weeks of high-saturation television and newspaper advertising across the state, urging the defeat of the chemical ban. They ran 27 full-page ads in the state's largest newspapers.[2] And in addition to weeks of television ads, they purchased radio spots, direct mail to voters, and paid robo-calls. The chemical industry front group at the time was called "Keep America Fire-Safe" (since renamed "Citizens for Fire Safety"). Despite their name, during their time before the Maine legislature, the chemical industry and its allies had no support from state fire safety groups or fire professionals.

"Keep America Fire-Safe" paid for an ad that claimed Maine legislators were seeking to weaken fire safety, accompanied by video of a burning house. The ad urged the public to call their legislators and tell them to vote against these proposed changes for the sake of fire safety. Despite the relentless ad campaign, very few members of the public called the State House, and the front group failed to convince the public of its argument. A nearly identical ad aired in Washington State, and then later in California, paid for by "Citizens for Fire Safety".

Maine's campaign was orchestrated by John Kyte, managing director at the time of Burson-Marsteller, the public relations firm, on behalf of the three major bromine chemical manufacturers (Albermarle, Chemtura, and ICL Industrial Products). Burson-Marsteller, on behalf of the bromine chemical companies, also did pro bono work for the National Association of State Fire Marshals, an organization that received significant financial support from chemical companies. That same fire marshals association then lobbied for more stringent state flammability standards—which would require more flame retardant chemicals.

Despite the conflict with the National Association of State Fire Marshals, our Maine flame retardant bans were strongly supported by Maine's fire professionals, including the State Fire Chiefs Association and the major state firefighter's union, the International Association of Fire Fighters. Both groups worked aggressively for the bills' passage, and the firefighters spoke passionately about the negative impacts of these chemicals on firefighter health. The men and women who are at greatest risk and most experienced

with house fires argued that safer alternatives should be used to protect both public health and public safety.

The chemical industry flew in paid scientific experts and a burn victim for the legislative hearing. The burn victim, who had obviously been seriously burned, claimed to have been burned as a child in his crib. When questioned by legislative committee members after his testimony, he admitted to being a paid witness for the chemical industry and he also admitted that his childhood burns weren't caused by a lack of flame retardant chemicals. Clearly the industry was going for shock value and not an accurate representation of one man's devastating injuries.

In 2010, we took on the issue of Deca-BDE in plastic pallets. The industry once again claimed that deca does not leach out of plastic, even with testing evidence to the contrary. We learned in Maine that each plastic pallet being used for a variety of uses, including the shipping of fresh and packaged foods, contained a few pounds of the Deca-BDE chemical, and that millions of plastic pallets were already un use. We realized that Maine's efforts in 2007 to reduce the amount of Deca-BDE in the environment through phase out of major home consumer uses could quickly be replaced by putting even larger amounts of the same chemical in shipping pallets and other uses. At no point did anyone credibly counter that Deca-BDE breaks down in the environment into far more dangerous toxic byproducts that can be easily absorbed by the human body.

In Maine, what we heard repeatedly from industry was that these chemicals were safe, and that there were no proven health impacts related to these chemicals, including the flame retardant Deca-BDE. Yet, after aggressively denying the health impacts before the Maine legislature in 2007, in 2009 the industry agreed to a U.S. phase out of Deca-BDE for virtually all consumer uses.

We learned early on in Maine, and again and again over the years, that the chemical industry's primary tactic is to deny, hide health information, and then agree to "voluntarily" stop producing the chemical—but still refuse to admit harm. After fierce lobbying and overwhelming media spending, Maine's results were likely disappointing to the chemical industry, but they were a win for Maine consumers and public health.

MINNESOTA:
In 2008, the flame retardant industry and "Citizens for Fire Safety" had already faced losses in several states, and they went all-out to defeat a ban on Deca-BDE and phthalates in the Minnesota legislature. "Citizens for Fire Safety", specific chemical companies, and the American Chemistry Council (ACC) hired sixteen paid lobbyists to work against the bans. At least four paid lobbyists, including the lead lobbyist against the ban, were being paid by the ACC during the 2008 session. At the time, the ACC employed eight state lobbyists working in the Minnesota legislature. Between the ACC and "Citizens for Fire Safety", the industry spent $335,000 on paid lobbyists alone, according to state ethics filings.

During one of the legislative hearings on the bill, paid industry expert Laura Ruiz testified on behalf of the Bromine Science and Environmental Forum that Deca didn't de-brominate, or break down into smaller toxic byproducts, the way other brominated flame retardant chemicals did. Numerous scientific studies in the US and Europe confirmed that

Deca-BDE did break down into more dangerous components that were more likely to cause negative health impacts, and yet the industry-paid "expert" was still denying this important information before a legislative panel. At certain points in her advocacy career, Ms. Ruiz held the title of Director of Consumer Advocacy for Albermarle Corporation, one of the three major brominated flame retardant manufacturers. On various occasions she also represented the Bromine Science and Environmental Forum. She once signed a letter as the chair of the "American Fire Safety Council", and also appeared as a representative of "Citizens for Fire Safety."

While promoting faulty science was disturbing, "Citizens for Fire Safety" took unethical lobbying to another level during the debate on the floor of the Minnesota House. During a heated debate on the bill, when they knew chances of losing were high, "Citizens for Fire Safety" distributed a misleading and unauthorized letter from the Hennepin County Hospital Burn Unit, claiming that more children would be burned and injured in Minnesota if the ban on Deca-BDE was successful. A legislator who also worked with Hennepin County recognized the letter as not authentic and approved by the hospital. Minnesota Speaker of the House Margaret Kelliher was so angered by the false letter that she had House pages collect and destroy every copy of the letter that had been printed and distributed.

Following that incident, the Minnesota House passed the ban. A similar measure passed the Senate, and, as in the House, did so with broad bi-partisan support. Unfortunately, the bill did not become law, as Governor Pawlenty caved to industry pressure and vetoed the legislation.

ALASKA:
Senator Wielechowksi, the sponsor of recent flame retardant proposals in Alaska, recently recalled the events of the past several years and their dealings with the infamous Dr. Heimbach as the Alaska Legislature debated flame retardant legislation. The *Chicago Tribune* exposé recently revealed that Dr. Heimbach's testimony and paid advocacy that helped defeat the flame-retardant ban in Alaska was based on misleading and false facts.

Dr. David Heimbach recounted the following story to the Senate Health and Social Services Committee on March 17, 2010[3]:

2:12:33 PM
DR. DAVID HEIMBACH, Professor of Surgery, University of Washington, said he takes care of all of the Alaskan burn patients and there were about 35 last year. He said that he has very strong feelings that sort of flame retardant should be used in sleepwear and mattresses because people who don't have this protection are at significant risk in the event of fire. He related a story of a six-week-old baby whose crib mattress did not have flame retardant. A dog knocked a candle into the crib and the baby sustained a devastating 75 percent burn, but a pillow in the bed had flame retardant and did not catch fire.

Though Alaska's flame retardant ban bill did pass the full Senate (14–6) in 2010, "Citizens for Fire Safety" and industry groups successfully influenced the vote of several Senators. It was held up in the House Labor and Commerce Committee.

The bill was brought back to the Senate floor in April of 2012, and one Senator stated that he was changing his vote from a "yes" to a "no" the floor of the Senate because of a paper that was handed to him as he walked onto the floor. The Senator stated in his floor speech that he came to the floor prepared to support the bill, but a statement from Dr. Heimbach changed his mind.

Senator Wielechowski recently requested a memo from Alaska legislative legal council concerning Dr. Heimbach's false testimony before the legislature. Unfortunately, though Dr. Heimbach deliberately misled Alaska state legislators, he likely did not do anything illegal, because he was not under oath when he gave those statements. So, in Alaska, as is the case in many other states, there is no recourse against the chemical industry for paying doctors to deliberately mislead legislators.

The expose in the *Chicago Tribune* and the stories from these three states—and many more like them—reveal a deceptive and dangerous industry that has only its financial interests in mind. They illustrate the extreme measures—including lying to legislators and misleading the public—that the chemical industry will employ simply to protect corporate profits.

This is the same industry that demands the public's trust about the safety and health impacts of chemicals in consumer products. But why on earth should any American trust these companies? My experiences as a legislator in Maine have me firmly convinced that the chemical industry cannot be trusted to accurately describe the safety—or lack thereof—of its own products. Our current federal chemical law has essentially put the fox in charge of the henhouse. We need real change.

Lastly, I want to speak to you as both a parent and a pregnant woman. In the last ten years, our understanding of the role chemicals play in the development of children and fetuses has changed dramatically. Though we still have much to learn, we are beginning to identify causal relationships that may explain the health trends we have watched unfold over the last several decades. We know for a fact that exposures to certain toxic chemicals impact the brain development, immune systems, and future reproductive systems of our kids.

We also know that the umbilical cord blood of every American pregnant woman tested shows multiple toxic chemicals. A 2011 study by University of San Francisco researcher Dr. Tracy Woodruff found certain PCBs, pesticides, PFCs, PBDEs, phthalates, and several other chemicals in 99 to 100 percent of the pregnant women tested. BPA was found in 96 percent of the women studied[4]. While the science is continually evolving and advancing, we know that exposure to chemicals in fetal development has been shown to increase a variety of negative health consequences, including impacts on all the major health system developments, from the brain to the immune and reproductive systems of fetuses.

In 2006, at the age of 30, I participated in a study of thirteen Maine people called "Body of Evidence"[5], in which I was tested for a battery of different chemicals in my body. We were tested for 71 different chemicals, including flame retardants, BPA, mercury, and PCBs. I had the second highest level of total phthalates and second highest level of mercury in the Maine study group. My mercury levels were above the safety standard for

protection of a developing fetus from subtle but permanent brain damage. And I had levels of flame retardants, arsenic, PFCs, and BPA that were all cause for concern.

Each of the thirteen Mainers who were tested had unsafe levels of at least one, if not multiple, chemicals that were higher than the national test results for most Americans. For me personally, I have spent most of my life as a resident of a small, offshore island with a beautiful landscape, no major industrial pollution, and few residents. Without a doubt, most of the chemicals in my body came from products and furniture in my home, personal care products, and the food I eat.

My chemical body burden results came in the midst of our legislative battles on flame retardants, in which lobbyists and "experts" from the chemical industry repeated their mantra that the chemicals we were seeking to regulate are unlikely to build up or remain in people's bodies, and that the average person carries chemicals in her body that are beneath the threshold of safety. Our study suggested exactly the opposite.

My chemical body burden results also came just months after my engagement. The idea of having children had just recently started to seem like a more immediate possibility.

The fact that chemicals were found in my body at a level that could impact not only my health but that of a developing baby changed me. Before, I had been simply an advocate for safer chemical reforms. Now, I am a passionate believer that something needs to be done to fix this system—especially for the sake of our kids. Suddenly the realization that this was something real—a threat to my health and the health of my friends, family, and future children—made this issue seem different, and more important than ever before.

As a former policy maker, my own personal information drives me to stay involved. But as a parent and mother, this information just makes me angry. How could we—citizens of one of the most technologically and scientifically advanced democracies in human history—allow ordinary household products to contain chemicals that we know cause negative health impacts for our children? What possible explanation—other than the power of chemical industry lobbying—could there be for such a situation?

We know that certain cancers, including childhood brain cancer and childhood leukemia, have increased over the last few decades. We know that the rates of autism have skyrocketed to the highest levels to date, now impacting 1 in 88 children born in the United States, and 1 in every 54 boys. We also know that women in my generation are far more likely to suffer from problems getting pregnant, compared to our mothers. And we know that American children are experiencing puberty at an earlier and earlier age than ever before—something I am already thinking about for my daughter, who isn't even two years old.

Many scientists tell us—with increasing certainty—that these health conditions are at least partially attributable to chemicals to which we are exposed in our homes, food, and environment. This is simply unacceptable.

Despite assurances from the chemical and consumer product industries that our products are safe, they are not. More importantly, there is no reason to believe that the companies producing the chemicals to which we're exposed are either willing or able to tell us

honestly whether their products are safe. Self-regulation of the chemical industry has been a colossal failure. That's why we need real reform of the TSCA.

Whether it is dangerous flame retardants in our couches, mattresses, and car seats, or BPA in children's toys or bank receipts, there is currently no required disclosure, no available public information, and no warning sign to enable consumers to educate and protect themselves.

And even when there is basic disclosure of chemicals, like in sunscreen or in baby shampoo, a parent would still have to have a consulting toxicologist to understand whether the ingredients in their children's products are safe.

Just this past year, the public found out that a major baby shampoo company contained a byproduct of cancer-causing formaldehyde in their product. To their credit, the company did agree to stop using the formaldehyde chemical in the shampoo, but the chemical wasn't clearly disclosed in the first place.[6] Most parents were outraged to hear that they had long been using a trusted product containing a toxic chemical. Because of the lack of regulation, we know that many chemicals are used in children's products that could have a variety of negative health effects. While parents have gotten good at researching online and looking for advice about what products are safe, this is too much to ask of busy parents. Just as we require that manufacturers of baby products like cribs and car seats establish that those products cannot collapse and suffocate or harm a child, we must require that they prove their products will not poison a child, either. All products that are sold and marketed for kids should be safe for their health.

Before my daughter was born, my husband and I researched crib mattresses, and after reading through a maze of websites and blog entries, we spent several hundred extra dollars on a mattress that was advertised as free of flame retardants. But most parents can't afford this, and don't know the dangers posed by flame retardants in the first place.

And despite our decision to buy a "green" crib mattress, we still have the same old couch, purchased about 10 years ago. My husband and I have a several-year-old mattress on our bed. Both are standard products, likely treated with flame-retardants and other chemicals.

Our home contains new and old electronics, remote controls, and phones—all of which seem to be magnets of interest for young children. At least some of these products likely contain various toxic flame retardants and other industrial chemicals. And, as we have learned, some of these chemical compounds have likely broken down and filled my home—and yours, and millions more across the country—with component chemicals that are more dangerous and more readily absorbed by humans.

Brominated flame retardants have been associated with developmental delays and brain impacts in children and developing fetuses, reproductive problems, cancer risks, and impacts on the immune system. A new study out just this month, for the first time, linked exposure to PBDE flame retardant chemicals during pregnancy with increased autism risk.[7]

Parenthood, especially with little children, is among the most exciting and rewarding life experiences. It can also be one of the most busy, sleep-deprived, financially strapped, and

stressful times for a family. With no transparency, so little regulation, and so little information—parents have little hope of successfully protecting their children from chemical exposure, or even of knowing what chemicals are in their own homes. Though we all do our best, no parent I know has a doctoral student in chemistry handy to check out every sippy cup, rubber duck, and couch cushion to make sure it's safe for her child.

We, the parents of this country, need leadership from the federal government on this complicated issue. We need policy makers who will stand up to an onslaught of propaganda and misinformation from the industries that have resisted this common sense change for so long. We need the Safe Chemicals Act, and we need it now.

In closing, I want to especially thank Senator Lautenberg for his leadership on the Safe Chemicals Act, Senator Boxer for moving this issue along during this crucial time, and I also want to thank my two Senators from Maine, Senators Snowe and Collins, for just this month joining in the bi-partisan call for a congressional overhaul of the chemical safety law.

I understand this committee will consider the Safe Chemicals Act as soon as tomorrow, and for the sake of my daughter and future child, children in Maine and across the country, I ask this committee to end this stalemate and take immediate action to remedy our broken chemical safety system. As we have learned in the states, the chemical industry will stonewall progress and hide health information at all costs. We rely on you, our elected officials, to protect the public health of our citizens. I thank you today for your leadership and I thank you in advance for your work tomorrow to advance this important cause.

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[1] *Chicago Tribune,* "Playing with Fire," May 6 – May 9, 2012 http://media.apps.chicagotribune.com/flames/index.html

[2] Print Ad Run in Maine Newspapers: http://www.preventharm.org/Images/130/Newspaperscan.pdf (It's a large PDF).

[3] Legislative Hearing Transcript from Alaska: http://www.legis.state.ak.us/basis/get_single_minute.asp?ch=S&beg_line=00333&end_line=00605&session=26&comm=HSS&date=20100317&time=1336

[4] UCSF Study website: http://www.ucsf.edu/news/2011/01/8371/ucsf-study-identifies-chemicals-pregnant-women

[5] For full results of the "Body of Evidence" report, go to: http://www.cleanandhealthyme.org/BodyofEvidenceReport/tabid/55/Default.aspx Individual results at: http://www.cleanandhealthyme.org/tables.htm

[6] *Forbes,* "As Report Reveals Toxic Ingredients in Baby Shampoo, Johnson & Johnson Goes Public with Plans to Clean Up Products," November 11, 2011, http://www.forbes.com/sites/amywestervelt/2011/11/01/as-report-reveals-toxic-ingredients-in-baby-shampoo-johnson-johnson-goes-public-with-plans-to-clean-up-products/

[7] *Oxford Journal*, Human Molecular Genetics, "Long-lived epigenetic interactions between perinatal PBDE exposure and mecp2308 mutation" http://hmg.oxfordjournals.org/content/21/11/2399

Professional Fire Fighters of Maine
Affiliated
International Association of Firefighters

John Martell, President
Tel. 207-432-2370

41 Brickyard Cove Rd.
Harpswell, Maine 04079

13 July 2012

Calvin M. Dooley
President and Chief Executive Officer
American Chemistry Council
700 Second Street, NE
Washington, DC 20002

Re: Telling the Truth About Chemical Flame Retardants

Dear Mr. Dooley,

We represent professional firefighters who work in harm's way every day to save lives and protect property from the ravages of fire. We are deeply concerned that the health and safety of our members continues to be jeopardized by exposure to unnecessary toxic flame retardants produced by the chemical industry.

We have been very involved with state legislation to protect public health from flame retardants without compromising fire safety. We have experienced first hand the unethical practices of your member companies that were documented in the recent investigation by the *Chicago Tribune*, "Playing with Fire," that included:

- Creation of a phony front group, Citizens for Fire Safety, which never served the interests of fire service professionals as claimed, but instead acted solely as a lobby arm of the chemical manufacturers that funded it;
- Providing false testimony to state legislatures through a burn doctor and burn victims who fabricated stories about tragedies that had nothing to do with the use of flame retardant chemicals; and
- Distorting the science about the health and safety hazards of flame retardant chemicals, including the polybrominated diphenyl ethers (PBDEs) such as Deca, to delay state action to phase out these dangerous chemicals.

Even we were shocked, however, to learn that chemical manufacturers also covered up data showing that flame retardants added to furniture did not even work as advertised. Yet that didn't stop your industry from deploying a tobacco industry lobbyist to manipulate state fire marshals to promote even greater use of these ineffective, toxic chemicals.

Enough is enough. We strongly urge your trade association to expel from your membership the three corporations that produce flame retardants, Albemarle, Chemtura and ICL Industries, whose unethical behavior rivals the tobacco industry.

Please respond at your earliest convenience, and inform us of the disciplinary actions you intend to take to hold your members accountable.

Sincerely,

John Martell, President
Professional Fire Fighters of Maine

Matt Vinci, President
Professional Fire Fighters of Vermont

Dennis Sweeney, Health and Safety Coordinator
New York State Professional Fire Fighters Association

Kelly Fox, President
Washington State Council of Fire Fighters

Calvin M. Dooley, President and Chief Executive Officer
American Chemistry Council
700 Second Street, NE
Washington, DC 20002

June 4, 2012

Dear Mr. Dooley,

As current and former state legislators from across the nation, we each have sponsored or worked directly on the regulation of flame retardants out of concern for public health in our respective states.

After reading the recent four-part *Chicago Tribune* investigative series, "Playing With Fire," in which the deeply unethical and longstanding practices of three different chemical companies (Albemarle, Chemtura, and ICL Industries) were revealed, we are writing to urge you to expel these unethical manufacturers from your industry trade group. The deception practiced by these companies—and revealed by the *Chicago Tribune*—is completely unacceptable in our state legislatures. Some of the most egregious practices, like lying about the death of an infant girl, are abhorrent by any measure.

We understand that the ACC has specific tenets as an organization, including "to lead in ethical ways that increasingly benefit society, the economy and the environment." In addition, your principles specifically include "communicating forthrightly with governments and communities about chemical risks."

In each of our states, we have had specific and disturbing dealings with the flame retardant chemical industry that violate basic ethical behaviors and certainly would not be considered honest or "forthright communication with government."

The worst industry tactics outlined in the *Chicago Tribune* series—which we each saw some of firsthand in our states—included: deliberately misrepresenting the science around flame retardant chemicals relating to both their effectiveness and their health risks; employing an expert witness who repeatedly invoked a phony story of a child dying in a fire in order to justify flame retardant mandates; creating a front group called "Citizens for Fire Safety" to counter the opposition to flame retardants among firefighters and health organizations; and using racial profiling to mislead community leaders about the impacts of toxic flame retardant chemicals.

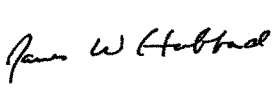
During the legislative debates on the flame retardant bills in our states, many of us as legislators were faced with public attacks from the industry front group "Citizens for Fire Safety," including significant paid television and newspaper ads. The message of those campaigns was that legislators were going to cause fires and threaten children. In some states, specific attacks were sent directly to the constituents of legislators who championed these bills. In nearly all of our debates

on this issue, our efforts to regulate certain fire retardants were supported by the International Association of Fire Fighters, the State Fire Chiefs organization in each state, and other fire safety professionals. And yet the industry continued its sham campaign.

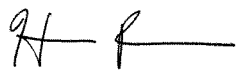
Since we championed these bills, some of these same flame retardant companies have come forth and begun a voluntary phase-out of some of the products we sought to regulate. While we applaud these actions, it only makes the deceptive behavior we saw with our own eyes—and that the *Tribune* series revealed to the world—all the more disturbing. And we are especially concerned that the industry has covered up the hazards of the replacement chemicals rather than investing in truly safer alternatives.

We urge immediate action on the part of the ACC to live up to its own mission and address these behaviors.

Sincerely,



Delegate James Hubbard
Maryland House of Delegates
Assistant Majority Leader



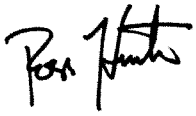
Honorable Hannah Pingree
Former Speaker of the Maine House
& Safer Chemicals, Healthy Families

Senator Jackie Dingfelder, Oregon Senate
Environment & Natural Resources Chair

Senator Sandra L. Pappas
Minnesota Senate

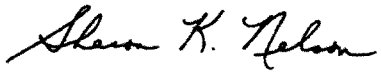
Assemblyman Robert Sweeney
Chair, Environmental Conservation
Committee, New York Assembly

Speaker of the House Shap Smith
Vermont House of Representatives

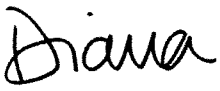


State Representative Ross Hunter
Washington House

Senator John Marty, Minnesota Senate



Senator Sharon Nelson
Washington State Senate
Chair, Environment Committee



Representative Diana Urban
Connecticut House

Representative Mark Meadows,
Michigan House

Senator Rebekah Warren,
Michigan Senate

Honorable Deb Kennedy,
Former Michigan State Representative
Former Chair of House Committee on the
Great Lakes & the Environment

Representative Mary Lou Dickerson
Washington House

Representative Karen Clark
Minnesota House

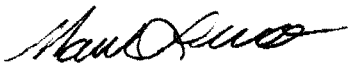
Representative Paul Holvey
Oregon House

Senator Mark Hass, Oregon Senate

Representative Sharon Treat
Maine House

Senator Phil Bartlett, Maine Senate

Representative Carolyn Tomei
Oregon House



Senator Mark Leno
California Senate
Chair of the Senate Budget & Fiscal
Review Committee

July 16, 2012

The Honorable Barbara Boxer, Chair
Senate Environment and Public Works Committee
112 Hart Senate Office Building
Washington DC 20510

The Honorable James M. Inhofe, Ranking Member
Senate Environment and Public Works Committee
205 Russell Senate Office Building
Washington DC 20510

Re: Request for Oversight Hearing on the Toxic Flame Retardants Scandal

Dear Senators Boxer and Inhofe,

As current and former state legislators from across the nation who are concerned about regulation of flame retardants, we are writing to request that you hold an oversight hearing on the unethical chemical industry activities that many of us witnessed firsthand in our legislatures. We want to share our perspective on those tactics and make it clear that the pattern of deception practiced by the chemical industry in state legislatures is unacceptable.

The recent four-part Chicago Tribune investigative series, "Playing With Fire" (May 2012) brought forth evidence that three chemical manufacturers (Albemarle, Chemtura and ICL Industries) engaged in tactics to avoid state regulation of toxic flame retardants. The worst industry tactics included misrepresenting the science related to both the effectiveness and health risks of flame retardant chemicals; employing an expert witness who repeatedly invoked a phony story of a child dying in a fire in order to justify flame retardant mandates; creating a front group called "Citizens for Fire Safety" to counter the opposition to flame retardants among firefighters and health organizations; and using racial profiling to mislead community leaders about the impacts of toxic flame retardant chemicals.

We are also disappointed that the trade group American Chemistry Council (ACC) has failed to enforce its mandatory code of conduct, known as Responsible Care, against these three member companies. When the CEOs of ACC members sign on to Responsible Care, they pledge "to lead in ethical ways" and promote forthright communication with governments. And yet, instead of censuring these companies for violating these principles, ACC just appointed Albemarle's CEO to their board of directors (June 2012). It's unfortunate that these practices seem to reflect business as usual to the chemical industry as a whole.

Clearly, the activities described in the Tribune series go beyond expressing a company's views. They are a misrepresentation of the science around flame retardants and clearly deserve further review.

During legislative debates on flame retardant bills in states around the country, many of us as legislators were faced with public attacks from this same industry front group including barrages of misleading paid television and newspaper ads. We have attached a few examples to illustrate the kinds of deception and intimidation of public officials employed by this industry.

In the absence of federal action, state legislators will sponsor new policies in 2013 that move away from flame retardants that have no added fire safety benefit, especially in products that impact our children and other vulnerable groups. We believe we can and must do better. There are well-documented, safer and more effective methods of deterring fires. The State of California is already taking a step forward with Governor Brown calling for a re-evaluation of fire safety standards. As 2013 legislative sessions start up, we will view the testimony of these companies in our legislatures through a very critical lens.

In the meantime, we urge you to treat this flame retardant scandal as an opportunity to strengthen our broken federal chemical management system. If the Safe Chemicals Act of 2011 (S. 847) were law, chemical manufacturers would not get away with replacing old toxic chemicals with new toxic chemicals, another practice exposed by the Chicago Tribune series. We need federal leadership. You can provide that through a timely markup and Committee vote on S. 847.

Thank you for your leadership and this opportunity to comment.

Sincerely,

Delegate James Hubbard
Maryland House of Delegates
Assistant Majority Leader

Hon. Hannah Pingree, Former Speaker
of the Maine House, Safer Chemicals,
Healthy Families

Honorable Deb Kennedy
Former Michigan State Representative
Former Chair of House Committee on
the Great Lakes & the Environment

Representative Karen Clark
Minnesota House

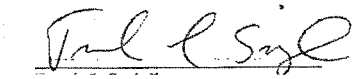
Representative Beth Kerttula
Alaska House of Representatives
House Minority Leader

Assemblyman Robert Sweeney
New York Assembly
Chair, Environmental Conservation
Committee

Representative Carl Sciortino
Massachusetts House

Representative Denise Provost
Massachusetts House

Representative Jay Kaufman
Massachusetts House



Representative Frank Smizik
Massachusetts House

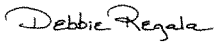
Representative Diana Urban
Connecticut House

Senator Terry Gerratana
Connecticut Senate

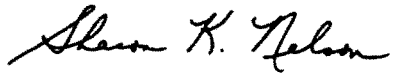
Senator Jackie Dingfelder
Oregon State Senate

Representative Sharon Treat
Maine House

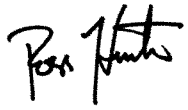
Senator Phil Bartlett
Maine State Senate



Senator Debbie Regala
Washington State Senate



Senator Sharon Nelson
Washington State Senate
Chair, Environment Committee



Representative Ross Hunter
Washington House

Representative Bob Duchesne
Maine House

Representative Carolyn Tomei
Oregon House

Representative Mary Lou Dickerson
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Representative Zack Hudgins
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Senator Jamie Eldridge
Massachusetts State Senate

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Maine House

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Oregon House

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New York Assembly

Assemblywoman Ellen Jaffee
New York Assembly

Assemblywoman Barbara Lifton
New York Assembly

Assemblyman Brian Kavanagh
New York Assembly

Representative Linda Chapa LaVia
Illinois House

Full list of Signatories to July 16, 2012 letter to Senator Barbara Boxer and Senator James Inhofe

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Representative Diana Urban, Connecticut House
Senator Terry Gerratana, Connecticut Senate
Representative Linda Chapa LaVia, Illinois House
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Alliance for a Clean and Healthy Maine

Body of Evidence

A STUDY OF POLLUTION IN MAINE PEOPLE

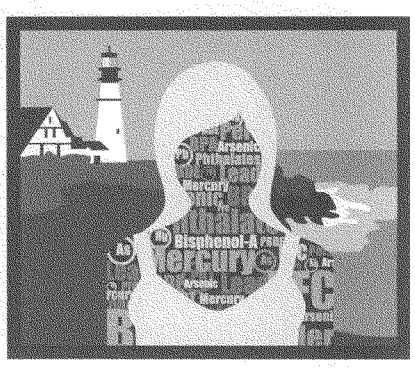
Executive Summary

Maine people are polluted with dozens of hazardous industrial chemicals, according to a new study conducted by the Alliance for a Clean and Healthy Maine with help from the University of Southern Maine. In 2006, thirteen Maine men and women volunteered to have their bodies tested in the first-ever study of chemical pollution in Maine people. This study found a total of 46 different chemicals (of 71 tested) in samples of blood, urine, and hair. On average, each participant had measurable levels of 36 toxic chemicals in their bodies.

These findings show that Maine people are routinely exposed to hazardous industrial chemicals including phthalates from cosmetics and vinyl plastic, brominated flame retardants (PBDEs) from televisions and furniture, Teflon chemicals from stain-resistant and non-stick coatings, bisphenol A from reusable water bottles and baby bottles, and toxic metals such as lead, mercury and arsenic.

These chemicals are found in products we use every day: plastic containers, toys, furniture, fabric, automobiles, TVs and stereos, water bottles, medical supplies, and personal products like shampoo, hairspray, and perfume. They are in our homes and offices, food and water, and the air we breathe.

Scientific research shows that these chemicals are hazardous and that even tiny amounts may threaten human health. They are toxic or harmful to life and



many are slow to degrade and also build up to high levels in the food chain. Babies in the womb and young children are especially vulnerable because they are still growing. Animal and human studies have linked these chemicals to learning and developmental disabilities, endocrine system damage, changes in sexual development, reproductive harm (including decreased sperm count in men), low birth weight and some cancers.

Despite proven and suspected dangers to our health, industry is not required to demonstrate the safety of chemicals before adding them to consumer products, nor are they required to use safer alternatives to chemicals known to be hazardous.

What We Found—Pollution in People

Russell Libby, 50, lives in Mount Vernon and is an organic farmer. Along with Bettie Kettell, Russell had the most chemicals detected (41 of the 71 that were tested). He also had the greatest number of PBDEs detected (27 of 46) and relatively high levels of individual PBDEs.

Amy Graham, 35, lives in Farmington and is a children's book author and homemaker. She has two young daughters, Phoebe and Sylvie. Amy had the second-highest level of one of the PBDE's which is a breakdown product of Deca, the toxic fire retardant.

Bettie Kettell, 60, is a nurse who lives in Durham. Bettie had the highest total level of PBDE flame retardants compared to the other Maine participants. Of the 71 chemicals that were tested in this study, 41 were detected in Bettie, a tie with Russell Libby for the most chemicals.

Paulette Dingley, 48, lives in Auburn and works with the American Red Cross as a health and safety instructor. Paulette had the highest level of two types of phthalates. She also had bisphenol-A chemicals in her body several times higher than the national average.

Dana Dow, 56, lives in Waldoboro, is a Republican State Senator and also owns a furniture store. Dana had the highest levels, and most different types, of perfluorinated chemicals which are often added to furniture to provide stain resistance.

Lauralee Raymond, 28, grew up in Aroostook County and attended Bates College. She now lives in Winthrop. She and her mother both participated in this study. Lauralee had higher levels of mercury, arsenic, and each of the flame retardants than her mother. She found this surprising since her mom has had more time to build up chemicals in her body.

Charlie Schmidt, 42, is a freelance science writer from South Portland. Charlie has a Master's degree in public health and has worked as a toxicologist. Charlie brings a professional appreciation to the growing interest in human body burden, and the challenging implications for public health.

Hannah Pingree, 30, is from North Haven and is in the Maine Legislature, where she is the House Majority Leader. Hannah had the second highest level of total phthalates and second highest level of mercury in the Maine study group.

Vi Raymond, 51, moved to Winthrop after spending 40 years in Fort Kent. She is married with five grown children, including fellow participant Lauralee. Vi had the highest phthalate total, and the highest level of BADGE-40H, of one of the bisphenol-A chemicals tested.

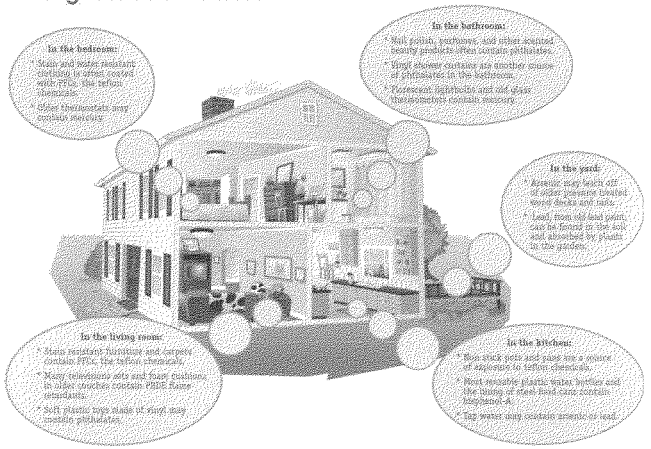
Eric Stirling, 32, owns and operates a sporting camp on First West Branch Pond, near the Appalachian Trail in the unorganized territory TA-R12. Eric had the highest level of mercury found among the study participants and his total arsenic amount was above the normal exposure level.

Denyse Wilson, 39, is a writing instructor. She is married with two children, Cecil and Francine. Denyse had the highest inorganic arsenic and arsenic(III) levels of all study participants.

Elise Roux, 18, is a senior at Cheverus High School in Portland. She lives in Windham. Elise had the highest level of bisphenol-A, about ten times the national average, and the second highest levels of BADGE-40H.

Regina Creeley, 54, lives in Hudson and is a special education instructor. Regina had the highest total arsenic level of all study participants.

The Chemicals Detected In This Study Are Found In Products Throughout Your Home...



What Does The Body Of Evidence Study Tell Us?

1. *People are routinely exposed to many hazardous chemicals.*
2. *These chemicals pose a potentially serious threat to human health.*
3. *Everyday products and materials are a major source of chemical exposure.*
4. *The safety system for industrial chemicals in broken.*

Most of these chemicals that enter our environment are manufactured by the chemical industry and added to the thousands of items in daily commerce that support our modern lifestyle. Yet industry is not required to prove that a chemical is safe before it is manufactured, sold, or used in consumer products. Nor are product makers required to use the safest alternatives, even when non-toxic substitutes are effective, available and affordable. Under our current system, thousands of toxic chemicals have been "grandfathered" in without adequate health and safety testing. And government is handcuffed with undue burden to prove harm before any precautionary actions can be taken to prevent chemical exposure. If this system was working, we would not find hazardous chemicals in people's bodies.

We can get these chemicals out of our homes—& keep them out of our bodies

The chemicals used in products throughout our homes were never intended to end up in our bodies but we now know that they are. The safety system for industrial chemicals is broken. New laws are needed to ensure that the products on store shelves are safe for our families.

To prevent pollution in Maine people, government should enact comprehensive safer chemicals policy at the state and federal level. Three actions are needed to close the gaps in our broken chemical system;

Close The Safety Gap

- Phase out the most harmful chemicals in favor of safer alternatives, for example Deca-BDE in electronics and furniture, and phthalates and bisphenol A in baby products.
- Search for safer substitutes for all chemicals shown to be hazardous.
- Require that all industrial chemicals be proven safe, especially for children.

Close The Data Gap

- Honor the public's right-to-know which hazardous chemicals are in what products.
- Require manufacturers to provide health and safety data on all industrial chemicals.
- Require that chemical manufacturers test and prove the safety of all industrial chemicals in commerce.

Close The Technology Gap

- Invest in research and development of bio-based plastics from Maine potatoes and other "green chemistry" solutions that will boost the state's economy.
- Establish a research center within the University of Maine System to assess hazards and alternatives for harmful chemicals.

The Body of Evidence study is a project of the Alliance for a Clean and Healthy Maine. The Alliance for a Clean and Healthy Maine is a coalition of Maine-based organizations committed to protecting human health from toxic chemical exposure. Forty-five organizations have endorsed the Alliance, representing health-affected children, workers, doctors, public health professionals, environmentalists and impacted communities.

Alliance for a Clean & Healthy Maine, Steering Committee:

Environmental Health Strategy Center, Learning Disabilities Association of Maine, Maine Labor Group on Health, Maine Organic Farmers and Gardeners Association, Maine People's Alliance, Maine Public Health Association, Natural Resources Council of Maine, Physicians for Social Responsibility - Maine Chapter, and Toxics Action Center Campaigns

For more information about campaigns to improve environmental health in Maine or for a full copy of the Body of Evidence report check out the Alliance for a Clean and Healthy Maine at

www.CleanAndHealthyMe.org

Alliance for a Clean and Healthy Maine | (207) 772-2181 | One Pleasant Street, Fourth Floor, Portland, Maine 04101

Table 1 -- The Chemicals Tested in Thirteen Mainers

Chemical Group Medium Tested Units of Measurement	Chemical Tested		Chemical Description
Phthalates Tested in Urine Results reported as nanograms per milliliter (ng/ml) or parts per billion (ppb)	**MMP**	Mono-methyl phthalate	A metabolite of DMP (dimethyl phthalate)
	MEP	Mono-ethyl phthalate	A metabolite of DEP (diethyl phthalate)
	MBP	Mono-butyl phthalate	A metabolite of DBP (dibutyl phthalate)
	MBzP	Mono-benzyl phthalate	A metabolite of BzBP (benzylbutyl phthalate)
	MEHP	Mono-2-ethylhexyl phthalate	All three are metabolites of DEHP, which is di-(2-ethylhexyl) phthalate
	MEOHP	Mono-(2-ethyl-5-oxohexyl) phthalate	
	MEHHP	Mono-(2-ethyl-5-hydroxyhexyl) phthalate	
PBDEs Tested in blood Results reported as picograms per gram (pg/g) on a lipid weight basis or parts per trillion (ppt)	**Polybrominated diphenyl ethers** 46 different PBDEs were measured of the 209 congeners that exist. See Table 2 for full list.		PBDE congeners are named from BDE-1 to BDE-209. They differ only by the location and number of the bromine atoms, which varies from 1 to 10. Congeners are chemical compounds that share the same basic structure.
PFCs or perfluorinated chemicals Tested in blood Results reported as nanograms per milliliter (ng/mL) or parts per billion	**PFBA**	Perfluorobutanoic acid	PFOA is the most prominent among this group of perfluorinated carboxylic acids. It has eight carbon atoms. The related compounds in this group range from having four to twelve carbon atoms. While PFOA is being phased out of some products, all of these compounds are possible breakdown products or manufacturing intermediates of other commercial PFCs.
	PFPeA	Perfluoro-n-pentanoic acid	
	PFHxA	Perfluorohexanoic acid	
	PFHpA	Perfluoroheptanoic acid	
	PFOA	Perfluorooctanoic acid	
	PFNA	Perfluorononanoic acid	
	PFDA	Perfluorodecanoic acid	
	PFUnA	Perfluoroundecanoic acid	
	PFDoA	Perfluorododecanoic acid	
	PFBS	Perfluorobutanesulfonate	Among these perfluorinated sulfonates, PFOS was phased out of Scotchgard in 2000 and replaced with PFBS. PFHxS is still used.
	PFHxS	Perfluorohexanesulfonate	
	PFOS	Perfluorooctanesulfonate	
	PFOSA	Perfluorooctanesulfonamide	A breakdown product of PFCs, which breaks down itself into PFOS
BPA Tested in blood Results in ng/mL or ppb	**BPA**	Bisphenol A	Monomer for polycarbonate plastic
	BADGE-4OH		A metabolite of BADGE (bisphenol A diglycidyl ether) used in epoxy resins
Metals Lead: tested in blood Results in ug/dL Methylmercury: tested in hair Results in ng/g or ppb Arsenic: tested in urine Results in ug/L or ppb	**Lead**		A soft metal that readily escapes from products with skin contact, as a dust that can be ingested or inhaled, or dissolved in drinking water.
	Methylmercury		A highly toxic form of mercury produced by bacteria in wetland environments from mercury pollution of the air and water, which builds up to high levels in fish and wildlife.
	Arsenic (total, inorganic and As(III)		Total arsenic includes organic arsenic which is relatively low in toxicity as well as highly toxic inorganic arsenic. Arsenic(III) is the most toxic form of inorganic arsenic.

Table 2 -- Complete Results of Chemical Screening of Thirteen Mainers

Chemical Class	Chemical Tested	Regina Creeley	Dana Dow	Paulette Dingley	Amy Graham	Bettie Kettell	Russell Libby	Hannah Pingree	Lauralee Raymond	Vi Raymond	Elise Roux	Charlie Schmidt	Eric Stirling	Denyse Wilson
Phthalates in URINE	**MMP**	< 3.32 < 3.42	< 1.73 < 1.16	12.1 46.5	5.17 7.18	2.99 7.29	13.1 8.9	26.6 23.1	21.6 14.2	19.6 22.7	15.8 8.19	< 6.28 < 5.87	3.56 6.78	< 26.3 < 17.2
	MEP	10.3 10.6	81.5 54.7	45.9 177	26.7 37.1	24.4 59.5	29 19.6	172 150	105 69.1	121 140	395 205	20.7 19.3	38.1 46.5	73.9 48.3
	MBP	26.2	23	23.8	15.7	28	39.7	74.7	107	68.2	87.4	48.5	35.4	144

in each box: The 1st result is in ng/mL or ~ parts per billion (ppb). The 2nd result is in ug/gCr-L (creatinine-corrected) or ~ ppb														
	MiBP	27.0	21.5	86.9	21.8	68.3	26.1	65.8	70.4	76.5	50.5	45.3	43.2	92.2
	MBzP	28.2 29.1	20.8 13.6	17.9 68.8	9.12 12.7	25.1 61.2	46.8 31.6	54 47	12.7 8.36	28.5 30.6	127 65.8	6.73 6.29	22.5 27.4	30.5 19.9
	MEHP	10.2 10.5	2.42 1.62	8.18 31.5	5.23 7.26	13 31.7	24.7 16.7	45.3 39.4	23.3 15.3	57.9 66.9	7.89 4.09	4.52 4.22	2.82 3.44	10.8 7.06
	MEOHP	15.4 15.9	6.15 4.13	8.05 31.0	7.47 10.4	30.9 75.4	27.6 18.6	106 92.2	52.1 34.3	114 132	29.1 15.1	8.56 8.00	8.81 10.7	22.6 14.8
	MEHHP	41.3 42.6	12.5 8.39	29.5 113	23.9 33.2	66.4 162	59.5 40.2	197 171	95.8 83.0	280 324	54.5 28.2	43.6 40.7	20.6 25.1	49.6 32.4
	Total Phthalates	133 137	156 105	144 555	93.3 130	191 465	239 162	677 588	418 275	685 793	727 377	136 127	134 163	342 223

Chemical Class	Chemical Tested	Regina Creeley	Dana Dow	Paulette Dingley	Amy Graham	Bettie Kettell	Russell Libby	Hannah Pingree	Lauralee Raymond	Vi Raymond	Elise Roux	Charlie Schmidt	Eric Stirling	Denyse Wilson
PFCs in blood SERUM results shown in ng/mL or ~ parts per billion (ppb)	PFBA	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576
	PFPeA	< 0.544	< 0.544	< 0.721	< 0.544	< 0.544	< 0.544	< 0.544	< 0.544	< 0.576	< 0.544	< 0.544	< 0.544	< 0.544
	PFHxA	< 0.476	< 0.476	< 0.478	< 0.476	< 9.86	< 0.476	< 0.476	< 0.487	< 0.476	< 0.719	< 0.755	< 0.539	< 0.811
	PFHpA	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556	< 0.556
	PFOA	1.52	18.4	3.05	1.05	4.55	4.43	5.03	3.7	7.69	3.55	4.41	5.61	1.23
	PFNA	0.823	3.07	1.21	< 0.468	1.57	1.86	1.96	0.93	1.61	1.16	1.56	1.37	0.897
	PFDA	< 0.504	1.21	< 0.504	< 0.504	0.615	0.551	0.683	< 0.504	1.23	0.828	< 0.504	0.826	< 0.504
	PFUnA	< 0.512	1.39	< 0.512	< 0.512	< 0.512	< 0.512	1.19	0.595	0.744	0.69	0.633	0.932	< 0.512
	PFDoA	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576	< 0.578	< 0.576	< 0.576	< 0.576	< 0.576	< 0.576
	PFBS	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41	< 1.41
	PFHxS	3.44	5.01	1.55	< 1.29	2.19	< 1.29	< 1.29	2.46	< 1.29	< 1.29	2.74	1.57	< 1.29
	PFOS	13.7	30	14.4	6.11	21.4	15.4	14.2	13.4	10.9	14.9	25	14.1	6.69
	PFOSA	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48
	Total PFCs	22.3	73.3	25.0	10.8	32.8	25.4	26.0	23.6	25.0	23.8	36.9	26.7	12.0

Chemical Class	Chemical Tested	Regina Creeley	Dana Dow	Paulette Dingley	Amy Graham	Bettie Kettell	Russell Libby	Hannah Pingree	Lauralee Raymond	Vi Raymond	Elise Roux	Charlie Schmidt	Eric Stirling	Denyse Wilson
BPA in blood SERUM	**BPA**	< 0.752	< 0.52	3.75	< 0.52	< 0.52	< 0.52	< 1.64	< 0.571	4.49	6.64	< 3.24	< 0.52	< 0.52
	BADGE-4OH	< 2.6	< 2.6	6.35	2.81	< 4.06	< 2.6	6.69	< 2.6	118	59.7	< 2.6	< 2.6	< 2.6
	results shown in ng/mL or ~ parts per billion (ppb)													

Chemical Class	Chemical Tested	Regina Creeley	Dana Dow	Paulette Dingley	Amy Graham	Bettie Kettell	Russell Libby	Hannah Pingree	Lauralee Raymond	Vi Raymond	Elise Roux	Charlie Schmidt	Eric Stirling	Denyse Wilson
PBDEs in blood SERUM results shown in pg/g on a lipid weight basis, which is approximately the same as parts per trillion (ppt)	BDE-7	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-8/11	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-10	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-12/13	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-15	439	86.7	* 141	80.2	200	506	603	225	119	66.1	144	60.6	480
	BDE-17/25	164	72.1	36.7	56.1	506	212	58.7	217	69.4	138	202	84.4	58.2
	BDE-28/33	900	399	350	518	2200	1850	554	1350	628	694	1340	493	801
	BDE-30	< 27.4	< 22.1	< 27.2	< 52.1	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-32	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-35	* 102	* 101	* 67.1	46.3	* 69.4	* 101	* 119	* 47.9	* 100	* 41.4	< 27.7	* 66.5	* 66.1
	BDE-37	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	37.1	* 55.3	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-47	5380	6490	2900	8390	33500	17200	5460	17500	7450	13000	18200	6550	6570
	BDE-49	136	57.5	48	83.9	275	140	97.6	117	98.3	112	156	70.5	82.6
	BDE-51	< 27.4	* 23.6	< 27.2	< 43.6	33.8	47.5	< 24.6	* 76.4	< 23.4	< 34.1	* 38	< 19.1	< 31.9
	BDE-66	122	* 73.4	* 55.2	128	506	240	87.4	215	* 101	169	207	93.3	93.5
	BDE-71	* 31.3	< 22.1	< 27.2	< 43.6	70.8	30.5	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-75	< 27.4	< 22.1	< 27.2	< 43.6	85.1	32.8	< 24.6	* 38.5	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-77	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-79	39	23.6	< 27.2	* 55.5	140	103	26.8	76.1	32.8	* 36.8	45	25.5	36.3
	BDE-85	177	103	53.2	148	745	254	85.3	306	137	229	365	99.9	75.9
	BDE-99	2210	1210	987	1870	9290	3290	1490	3170	1490	3310	3660	1440	1130
	BDE-100	1350	1440	454	1260	6350	4780	965	7230	1650	2550	3390	1150	922
	BDE-105	< 32	< 22.1	< 27.2	< 57.8	< 34.3	< 26	< 24.6	< 31.3	< 23.4	< 34.1	< 36	< 19.1	< 31.9
	BDE-116	< 45.4	< 22.1	< 28	< 85.4	< 49.8	< 36.9	< 25.3	< 42.3	* 51.7	< 34.3	< 50.5	23.9	< 33
	BDE-119/120	< 29	< 22.1	< 27.2	< 53.6	* 54.8	* 48	< 24.6	* 56.2	< 23.4	< 34.1	< 32.8	< 19.1	< 31.9
	BDE-126	< 27.4	< 22.1	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-128	< 27.9	< 134	< 31.4	< 52.6	< 43.2	< 34.6	< 31.5	< 40.8	< 25.2	< 39.4	< 37.3	< 20.8	< 36.5
	BDE-138/166	47.5	* 40.4	< 27.2	* 56.8	121	101	< 24.6	84.2	32.4	59	93.8	21.2	< 31.9
	BDE-140	56.7	28	< 27.2	49.4	77.8	68.3	< 24.6	113	31.1	49.6	72.6	50.5	< 31.9

	BDE-153	4840	3680	1390	4520	4060	5570	2780	15300	3930	2640	4300	3120	2150
	BDE-154	200	145	96.8	229	746	505	131	396	166	200	375	150	119
	BDE-155	* 45.9	* 31	< 27.2	* 70.5	* 78.6	* 59.5	* 35.4	* 57.8	* 34.6	* 57.6	* 62.3	* 42.2	* 37.3
	BDE-181	< 28.2	< 26.8	< 27.2	< 43.6	< 25.7	< 25.7	< 24.6	< 31.3	< 23.4	< 34.1	< 27.7	< 19.1	< 31.9
	BDE-183	297	352	* 147	623	531	445	159	417	210	271	1400	262	328
	BDE-190	< 40.8	< 39.7	< 27.2	< 45.5	< 30	< 32.5	< 24.6	< 31.3	< 23.4	< 34.1	< 36.3	< 19.1	< 31.9
	BDE-203	190	* 248	90.1	* 177	91.1	* 153	134	* 111	* 94.8	* 129	303	104	* 191
	BDE-206	< 328	< 799	< 328	< 526	< 308	< 308	< 441	< 378	< 282	< 408	< 666	< 345	< 768
	BDE-207	< 328	< 799	< 328	< 526	< 308	< 308	< 441	< 378	< 282	< 408	< 666	< 345	< 768
	BDE-208	< 328	< 799	< 328	< 526	308	< 308	< 441	< 378	< 282	< 408	< 666	< 345	< 768
	BDE-209	< 4920	<10700	< 4910	< 3940	< 4620	< 3080	< 8620	< 5660	< 4220	< 6120	< 9990	< 3450	< 11500
	Total PBDEs	**20,088**	**14,751**	**6,918**	**18,579**	**59,869**	**35,955**	**12,782**	**47,343**	**15,518**	**24,229**	**34,594**	**19,971**	**13,410**
Chemical Class	**Chemical Tested**	**Regina Creeley**	**Dana Dow**	**Paulette Dingley**	**Amy Graham**	**Bettie Kettell**	**Russell Libby**	**Hannah Pingree**	**Lauralee Raymond**	**Vi Raymond**	**Elise Roux**	**Charlie Schmidt**	**Eric Stirling**	**Denyse Wilson**
Metals														
Pb in BLOOD in ug/dL	**Lead**	**1.10**	**1.06**	**1.46**	**0.549**	**0.716**	**1.07**	**1.20**	**0.719**	**0.884**	**0.507**	**3.26**	**1.14**	no data
MeHg in HAIR in ng/g or ppb	**Methylmercury**	*** 156**	**497**	**396**	**437**	**333**	*** 215**	**1140**	**759**	**291**	**778**	**** 186**	**1180**	**257**
As in URINE 1st # is in ug/L 2nd is ug/gCr-L (creatinine corrected) – both are ~ ppb	**Arsenic** (Total)	**843** **869**	**98.1** **65.8**	**3.51** **13.5**	**11.2** **15.5**	**21.2** **51.7**	**16.1** **10.9**	**30.7** **26.7**	**59.6** **39.2**	**11.1** **12.8**	**8.18** **4.24**	**40.2** **37.6**	**58.6** **71.5**	**56.7** **37.1**
	Arsenic (Inorganic)	**0.238** **0.245**	**0.496** **0.333**	**0.162** **0.623**	**0.575** **0.799**	**0.173** **0.422**	**1.11** **0.75**	**1.13** **0.98**	**1.07** **0.79**	**0.753** **0.871**	**0.48** **0.25**	**0.508** **0.476**	**0.299** **0.385**	**1.16** **0.76**
	Arsenic(III)	**0.210** **0.216**	**0.420** **0.282**	**0.160** **0.623**	**0.450** **0.625**	**0.150** **0.366**	**0.740** **0.500**	**0.730** **0.635**	**0.83** **0.55**	**0.620** **0.717**	**0.44** **0.52**	**0.140** **0.131**	**0.200** **0.244**	**0.83** **0.54**
Chemical Class	**Chemical Tested**	**Regina Creeley**	**Dana Dow**	**Paulette Dingley**	**Amy Graham**	**Bettie Kettell**	**Russell Libby**	**Hannah Pingree**	**Lauralee Raymond**	**Vi Raymond**	**Elise Roux**	**Charlie Schmidt**	**Eric Stirling**	**Denyse Wilson**
Protein in URINE	Creatinine (mg/dL)	97	149	26	72	41	148	115	152	86.5	193	107	82	153
		These normal protein levels are used to adjust the measured chemicals in urine to account for dilution due to varying amounts of fluid intake per person												

NOTES:

Boldface type in a colored box indicates the chemical was detected

< the chemical was not found above the limit of detection indicated; the chemical might be present below this limit

*** the chemical was detected but the quantification criteria were not met, therefore the result represents the estimated maximum possible concentration**

**** estimate**

To calculate the sum total for Phthalates, PFCs and PBDEs, any value reported as non-detected (< #) was assigned a value of ½ the detection limit; For the same purpose, any PBDE value that was flagged (*) as not meeting quantification criteria was assigned a value of ½ the reported value.

Table 3 -- Summary of Results of Maine Body Burden Study

RESULTS FROM 13 MAINE PARTICIPANTS				RESULTS FROM OTHER STUDIES			
Phthalates	units = ug/gCr-L (creatinine corrected)			from federal CDC 3rd National Exposure Report [1][1] n = 2,536 for MEP; n = 2,772 for all other phthalates[1]			
	Minimum	**Maximum**	**Median – or 50th %tile**	**Median – or 50th %tile**	**75th %tile**	**90th %tile**	**95th %tile**
MMP	< 1.16	46.5	8.19	1.33	2.62	5.00	7.97
MEP	10.6	205	54.7	147	388	975	1860
MBP	21.8	92.2	50.5	26.0	51.6	88.6	119
MBzP	6.29	68.8	29.1	13.5	26.6	55.1	90.4
MEHP	1.62	66.9	10.6	3.89	7.94	18.2	32.8
MEOHP	4.13	132	15.9	11.2	21.3	45.1	67.5
MEHHP	8.39	324	40.7	16.6	32.3	70.8	147

Sum TOTAL	105	793	223	219	530	1,268	2,375
PBDEs	units = pg/g on a lipid weight basis			from McDonald 2005 [92] n = 62 women from CA & IN		n = 10	n = 11
	Minimum	**Maximum**	**Median – or 50th %tile**	**Median – or 50th % tile**	**95th %tile**	**Washington Median [93]**	**California Median [94]**
BDE-15	60.6	603	144			275	-
BDE-17/25	36.7	506	84.4			61.7	-
BDE-28/33	350	2200	694			1128	-
BDE-35	< 27.7	119	* 68.5			< 5.64	-
BDE-37	< 19.1	* 55.3	< 27.7			10.0	-
BDE-47	2900	33500	8380	included below	incl. below	19950	14100
BDE-49	48	275	98.3			178	-
BDE-51	< 19.1	83.8	< 31.9			~ 12	-
BDE-66	* 55.2	506	122			170	-
BDE-71	< 19.1	70.8	< 31.3			< 17.4	-
BDE-75	< 19.1	85.1	< 27.7			25.0	-
BDE-79	< 27.2	140	* 38.8			* 61.1	-
BDE-85	53.2	745	148			346	-
BDE-99	987	9280	1870	included below	incl. below	4255	3100
BDE-100	454	7230	1550	included below	incl. below	3115	2100
BDE-116	< 22.1	* 51.7	< 36.9			< 22.4	-
BDE-119/120	< 19.1	* 56.2	< 31.9			22.8	-
BDE-138/166	21.2	121	47.9			73.8	-
BDE-140	< 24.6	77.8	49.6			~ 44	-
BDE-153	1390	15300	4060	included below	incl. below	2725	3400
BDE-154	96.8	746	200	included below	incl. below	368	280
BDE-155	< 27.2	* 78.6	* 45.9			43.4	-
BDE-183	* 147	1400	328			218	-
BDE-203	90.1	303	134			152	-
Sum TOTAL	6,918	59,869	19,971	40,700	305,000	47,500	22,980
PFCs	units = ng/mL in blood serum (wet weight)			n = 476 women & 442 men		n = 10	n = 12
	Minimum	**Maximum**	**Median**	**National Mean (estimated) [95]**	**Washington Median [96]**	**California Median [97]**	
PFOA	1.05	18.4	4.41	3.97 to 6.98	3.6	5.3	
PFNA	< 0.468	3.07	1.56	0.51 to 1.10	-	1.67	
PFDA	< 0.504	1.23	0.551	-	-	0.43	
PFUnA	< 0.512	1.39	0.595	-	-	0.40	
PFHxS	< 1.29	9.01	1.57	4.33	-	2.44	
PFOS	6.11	38	14.2	23.4 to 40.2	21.3	25.6	
Sum TOTAL	10.8	73.3	25.6	32.2 – 52.6	24.9	35.8	
BPA	units = ng/mL in blood serum (wet weight)			n = 7 for BPA n = 30 for BADGE	n = 11	n = 14 women + n = 11 men ♂	
	Minimum	**Maximum**	**Range Detected**	**Geometric Mean - EWG [98]**	**California Median [99]**	**Mean** - Takeuchi and Tsutsumi [100]	
BPA	< 0.52	6.64	3.75 – 6.64	1.08	0.46	0.64 ♀ to 1.49 ♂	
BADGE-4OH	< 2.6	119	2.81 - 119	9.33	12.8	-	
Metals							
Lead	**Minimum**	**Maximum**	**Median - 50%**	**Median – or 50th%tile**	**75th%tile**	**90th%tile**	**95th%tile**
	0.51	3.26	1.08	1.40	2.20	3.40	4.40
Units = micrograms of lead per deciliter of blood (ug/dL)				n = 8945, from federal CDC 3rd National Exposure Report [101]			

Mercury Methylmercury	**Minimum**	**Maximum**	**Median - 50%**	**U.S. Women of Childbearing Age**		**U.S. Women of Childbearing Age**	
				Mean	**95th %tile**	**Median**	**90th %tile**
Top row: n = 13 Mainers	156	1180	396	360	2400	200	1400
	257	1140	759				
Bottom row: n = 5 Maine women of childbearing age							
Units = nanograms methylmercury per gram of hair (ng/g) or ppb				Smith (1997) *cited in* National Research Council [102]		n = 702 (CDC, 2001) [103]	
Reference Dose, level above which fetal brain development is at risk = 1000 ppb methylmercury in hair							

Arsenic	Minimum	Maximum	Median - 50%	Pellizari & Clayton (2006) [104] Median – 50th	Washington Median [105]	
Total As	3.51	843	30.7	10.23	11	
Inorganic As	0.16	1.16	0.51	-	-	
Arsenic(III)	0.14	0.83	0.44	-	-	
Units = micrograms of arsenic per liter of urine (ug/L) or ppb				n = 102	n = 10	

NOTES: Minimum and Maximum are the lowest and highest values reported among the 13 Maine participants. The median is the reported value that falls in the middle of the range of all reported values. The median is the same as the 50th percentile (50th %tile), which means that half or 50% of the reported values are less than this number and half are greater than it; The 75th percentile (75th %tile) is the number that is greater than three-quarters or 75% of all the reported values (and is less than one-quarter or 25% of all the reported values); The 90th percentile (90th %tile) is the number that's greater than nine-tenths or 90% of all the reported values (and less than 10% of all reported values); The 95th percentile (95th %tile) is the number that is greater than 95% of all the reported values (and less than 5 % of all reported values); < means that the chemical was not found above the limit of detection indicated (but the chemical might be present below this level); * means that the chemical was detected but the quantification criteria were not met, therefore the result represents the estimated maximum possible concentration for that sample; n = the number of individuals sampled. For PFCs, the sum total is the median value of the minimum, maximum, and total among all Maine participants. For the comparative results, the sum total is the sum of the reported values. The values reported for the PFC national mean are the least squares means estimates of serum concentrations for non-Hispanic white females (lower value) and non-Hispanic white males (higher value) from pooled samples obtained through the 2001-2002 NHANES. The lead national mean is based on total results for the U.S. population aged one and older from 2001-2002 NHANES. See note 1, Table 16, p.38.

Senator BOXER. Thank you so very much.

We will hear from the next majority witness, Dr. Heather Stapleton, Associated Professor of Environmental Chemistry, Environment Sciences and Policy at the Nicholas School of the Environment at Duke University.

Welcome.

STATEMENT OF HEATHER M. STAPLETON, PH.D., ASSOCIATE PROFESSOR, NICHOLAS SCHOOL OF THE ENVIRONMENT, DUKE UNIVERSITY

Ms. STAPLETON. Good morning. I wish to thank Senator Lautenberg, Senator Crapo, and Senator Boxer and the other members of this Committee for inviting me to testify here today.

I am Heather Stapleton, an Associate Professor of Environmental Chemistry at Duke University. For the past 10 years, I have been conducting research on flame retardant chemicals, and today I would like to talk to you about my research and what we know about human health risks.

Current scientific evidence demonstrates that the U.S. population is exposed to flame retardant chemicals used in consumer products at levels that are approximately 10 times higher than levels in European and Asian countries, most likely due to difference in our flammability standards.

According to research conducted by the Centers for Disease Control and Prevention, 99 percent of the U.S. population has flame retardant chemicals in their bodies. Studies have also shown that children have much higher body burdens of these chemicals compared to adults. This is a concern given that health studies found that higher body burdens of these chemicals were associated in reductions in IQ and motor skills in children, lower birth weights in infants, changes in hormone levels, and a reduction in a woman's potential to become pregnant.

In my opinion, this evidence warrants changes in the way these chemicals are currently applied to consumer products and highlights a need to reduce our exposures in vulnerable populations such as infants and children.

I would now like to summarize several key findings from my research. It is impossible for an average person to avoid exposure to flame retardants. The primary route of human exposure to these chemicals is from inadvertent ingestion of dust particles in the home which is more pronounced for infants and young children that are more vulnerable to chemical exposures.

Over the past 8 years, we have analyzed hundreds of samples of indoor dust collected from different regions of the U.S., and today I have not found one sample that does not contain the flame retardants known as PBDEs.

An average consumer also does not have the choice or an option to buy products that are free of flame retardants. There are no labels indicating whether or not a flame retardant chemical has been applied. The only way to determine if a product is treated with these chemicals is to take a sample of that material and chemically analyze it in a laboratory using very expensive analytical equipment. This allows us to determine the chemical structures of these

flame retardant formulations which are often proprietary and also allows us to determine their concentration in the products.

My research team has analyzed over 100 samples of polyurethane foam collected from residential furniture purchased in the U.S. and found that more than 85 percent is indeed treated at levels that can be as high as 10 percent by weight of the foam, as are most baby products that are considered furniture items. This includes nursing pillows, sleep positioners, baby mats, car seats, and others. Infants spend almost 24 hours a day in intimate contact with these items, and no risk assessments have been conducted to determine the level of exposure an infant receives during use of these products.

The two most common flame retardants detected in furniture and baby products on the market today are chemicals known as chlorinated tris and Firemaster 550, replacements for the now phased out PBDEs. Chlorinated tris is considered a probable human carcinogen, and the Consumer Products Safety Commission estimated that a child's exposure to chlorinated tris from residential furniture would be 5 times higher than the acceptable daily limit. This assessment did not include children's exposure to chlorinated tris from baby products which would increase this exposure.

In addition, a very recent study conducted by my colleagues and I found that exposure to Firemaster 550 in rodents resulted in obesity, changes in hormone levels, advanced puberty, and altered behavior at a level that was more than 10-fold lower than what the chemical company stated was the lowest level at which any adverse effects would be observed.

Our research also shows that these same two flame retardants are now found in more than 95 percent of the U.S. homes, and levels in indoor environments are just as high as the levels of PBDEs, implying that exposure levels are the same.

These points highlight what I call the chemical conveyor belt. When one chemical is phased out, another similar chemical is often used as a replacement, and we know less about its potential effects than a chemical it replaced.

History has shown us that if often takes millions of taxpayer dollars and several decades collecting data on these new chemicals before we realize there is a health hazard. We should, in my opinion, consider how this process could be reformed.

In closing, I would like to urge this Committee to strongly consider legislation that would reduce our children's exposure to flame retardant chemicals that have known health effects which can be done without compromising fire safety as was demonstrated at a hearing last week.

I have dedicated much of my scientific career to testing consumer products for these chemicals to provide information on sources within the home, and as a result I have received numerous e-mails and phone calls from average Americans asking where they can find flame retardant-free products or how they can reduce their exposure. Unfortunately, I cannot provide all the answers because we still do not yet fully understand how many products are treated or exactly what chemicals are used in all applications.

In my opinion, both as a scientist and as a mother myself, consumer products should be labeled to indicate specific chemical treatments to provide consumers a choice, particularly when it involves the use of suspected carcinogens in baby products.

Last, I would just like to note that my research has been funded by the National Institutes of Environmental Health Sciences and the National Science Foundation.

I thank you for considering my testimony.

[The prepared statement of Ms. Stapleton follows:]

Human Exposure to Flame Retardant Chemicals and Health Concerns

Testimony before the
U.S. Senate Committee on Environment and Public Works
Tuesday, July 24th, 2012
Dirksen Senate Office Building, Room 406

Heather M. Stapleton, Ph.D., Associate Professor
Nicholas School of the Environment, Duke University

Good morning. I wish to thank Senator Lautenberg and the other members of this Committee for inviting me to testify today. I am Heather Stapleton, an associate professor of environmental chemistry at Duke University. Since 2001 I have worked closely with a team of researchers investigating the sources, fate, and effects of flame retardant chemicals in the environment, in addition to monitoring human exposure to these chemicals. Through these unique collaborations we have accumulated much information on flame retardants that has helped us to better understand the potential hazards of these chemicals, which can now be weighed against their purported benefits. Today I'd like to talk to you about flame retardants, my research, and what we know about health risks to humans.

Human Health Studies. According to research conducted by the Centers for Disease Control and Prevention, 99% of the US population has flame retardant chemicals in their bodies[1], and US adults have body burdens that are an order of magnitude higher than levels in European and Asian countries[2]. Studies have also shown that children clearly have much higher exposures and body burdens of flame retardants compared to adults [1,3,4].

Over the past 5 years, several studies have observed associations between a specific class of flame retardants called polybrominated diphenyl ethers (or PBDEs), and adverse health effects among the US population. Most notably were two recent US studies that found that higher concentrations of PBDEs in infants at birth are associated with reductions in IQ and deficits in gross and fine motor skills later in childhood, and reduction in a women's capacity to become pregnant[5,6]. Other studies have shown that PBDE levels in maternal tissues during pregnancy are associated with increased risk of undescended testicles in male infants, and lower birth weights and head size in newborns[7-9]. Decreases in birth weight are a significant concern as low birth weights in infants predisposes children to more health problems later in life. In addition, PBDE levels in adults have been associated with significant alterations in thyroid hormone levels[10-12]. While none of these studies are definitive, it should be noted that they examined exposures occurring among the general population, and if true, many Americans may be affected.

Unfortunately, no studies have yet examined human health effects related to newer flame retardants used as replacements for PBDEs in consumer products, and which are now found in almost all homes (see exposure section below).

Human Exposure to Flame Retardants. In the late 1990s, mounting evidence began to demonstrate that PBDEs were increasing in human tissues and the environment [2,13]. Furthermore these chemicals were found to be capable of concentrating in tissues following exposure[14], and were estimated to persist in the environment for decades [2]. They are now ubiquitous in our environment as they are very resistant to degradation and can be transported long distances in the atmosphere.

Exposure to PBDEs results from both diet and indoor exposures primarily from dust. Due to their ubiquity in the environment, PBDEs have been detected at low levels in fruits, vegetables, meat, dairy and seafood items.[15,16] However, exposure assessments conducted by the EPA suggest that only 17 % of an adult's exposure to PBDEs is from the diet and 66 % is from dust, whereas in children more than 95% is from dust exposure[17]. More recent studies have confirmed that exposure to house dust particles contaminated with PBDEs is a significant pathway by which people are exposed to PBDEs[18-20], but we have not been able to determine from where the PBDEs in the dust originated. Most researchers assume that treated sources in the home (e.g. furniture, TVs, etc), contribute to this exposure, and our data does suggest that treated furniture and TVs are significantly associated with PBDE levels in indoor dust[21]. However, simple physical examination of the product and/or its labels will not tell us whether or not a product is treated with PBDEs. The only current way to determine whether or not a product is treated with a specific flame retardant is to take a sample of the product and chemically analyze it in a laboratory, a very expensive and laborious process.

Over the past six years my research group has examined human exposure to PBDEs, and other flame retardant chemicals, in indoor environments. As part of this research we have analyzed several hundred samples of indoor dust, including samples from bedrooms, main living areas and car interiors. To date I have not found **one** dust sample that does NOT contain PBDEs. Every home we have tested contains PBDEs, and the levels in indoor dust can vary by a factor of a million. For reasons we do not yet fully understand, some people have very low levels of PBDEs in their homes (parts per billion), while other people have very high levels (parts per thousand). Our studies have also shown that people with high levels of PBDEs in their dust, will most likely have high levels in their bodies[19,20].

More recently we have investigated exposure of toddler's to PBDEs[20]. Using a novel approach, we wiped the surface of children's hands to determine if PBDEs were present on their skin. We found that PBDEs were present on 98% of children's hands, and levels of PBDEs on the hands were highly related to the concentrations of PBDEs measured in their bloodstream. This suggests than children ingest PBDEs from hand to mouth contact, which is typical in young children. EPA studies have demonstrated that toddlers may place their hands in their mouth 18 times/hour on average[22]. The PBDE levels on the children's hands most likely results from contact with the dust in their homes, or perhaps direct contact with treated products. We also found that children from lower socioeconomic backgrounds had levels of PBDEs in their blood that were two times higher than white children born to more educated parents. At present, reasons for this difference are unclear.

Since identifying the new use flame retardants in infant products and furniture (see next section), we have started conducting measurements on these new chemicals in indoor dust, and are

developing methods to measure concentrations in human serum and urine. Of particular interest to us is a PBDE replacement chemical called "chlorinated tris" or TDCPP. TDCPP is a suspected carcinogen according to the Consumer Product Safety Commission[23] and is listed as a cancer-causing chemical under California's Proposition 65. TDCPP was once applied as a flame retardant to children's pajamas during the 1970s. However, studies found that a closely related brominated flame retardant was a mutagen, was absorbed through children's skin, and its metabolites were detected in urine[24-26]. TDCPP was also identified as a mutagen and was voluntarily phased out from use in children's sleepwear. Our research now indicates that TDCPP is also present in dust samples, as are the components of a second flame retardant mixture called Firemaster 550 (FM 550). Similar to PBDEs, TDCPP and FM 550 are present in more than 95% of the indoor dust samples analyzed, and levels are equivalent to, or in some cases higher than, levels of PBDEs.[27,28] Therefore, daily exposure to these new flame retardants is expected to be very similar to PBDE exposure among the general population. In addition, we have identified the primary metabolite of TDCPP in more than 98% of human urine samples analyzed to date[29] (and unpublished data), confirming to us that chronic daily exposure to TDCPP is occurring. This suggests children are presently receiving exposure to mixtures of these flame retardants, which may be a concern in light of the neurodevelopmental toxicities associated with some of these chemicals (see toxicity section below) and the observed increase in neurodevelopmental disorders occurring in US children (e.g. autism, ADHD, etc). This highlights a critical need for labeling information on commercial products so consumers can make informed decision about the risks they want to take.

While our research group is working very hard to measure human exposure to these flame retardants from contact with indoor dust, no studies to date have investigated an infant's exposure to flame retardants found in baby products. Because a majority of the infant products are treated with flame retardants (typically TDCPP), and because infants spend almost 24 hours each day in intimate contact with many of these products, studies must be conducted to measure potential exposure to these chemicals. Infants are very vulnerable to toxic exposures as they are still rapidly developing, particularly their brain, making them more vulnerable to effects from toxic chemicals. Inhalation and skin absorption may be significant routes of exposure to some of the chemicals which have not been assessed. A study conducted by the Consumer Product Safety Commission (CPSC), evaluated children's exposure to TDCPP from assumed use in residential furniture and estimated that exposure levels were 5 times higher than the acceptable daily exposure level.[23] The report did not consider potential exposure from contact with infant products, which may be greater than exposure from residential furniture alone.

Products Containing Flame Retardants: For more than 30 years additive flame retardants have been applied to various types of products, including children's pajamas, furniture, electronic items (e.g. TVs, computers, cell phones, DVD players, etc), textiles (e.g. curtains, upholstery), and common building materials (e.g. wiring, insulation, etc). There are various state and federal flammability codes or standards that have led to the use of these chemicals in different types of commercial products, and in transportation equipment (e.g. airplanes, trains, sub-ways, automobiles, etc). The type of chemical used to flame retard a specific material or product will depend upon several variables, including the type of material being treated, the availability and cost of the chemical flame retardants, and the specific standard that is trying to be met.

The chemical structures of flame retardant additives used in consumer products are often proprietary; when submitting pre-manufacture notices to the EPA, the chemical companies must reveal the chemical structures to the EPA, but can declare the structures confidential business information (CBI), which protects that information from being released to the general public. This practice has resulted in large data gaps in our understanding of flame-retardant uses, application levels, and potential sources of human exposure. Through my personal communications with polyurethane foam manufacturers in the US (who produce foam for furniture manufacturers), I have learned that foam manufacturers themselves often do not know the specific chemicals used in the flame retardant formulations they purchase and apply to their foam. This lack of transparency and communication means that academic researchers, and the general public, have trouble understanding if and how people are exposed to these types of chemicals.

The lack of transparency in flame retardant use and applications motivated my collaborators and I to conduct research on consumer products to determine how often flame retardants are used and at what levels. Due to the concerns mentioned above, two of the three PBDE commercial mixtures were voluntarily phased out from production in the US starting in 2005. However, the flammability standards still remain, and thus new flame retardant chemicals have been introduced into consumer products as PBDE replacements. When this phase-out went into effect in 2005, there was no information available on the chemical replacements. Therefore, my collaborators and I started a research project to identify products that contain flame retardants and which may be sources of human exposure, to better understand potential health risks. In 2009 we initiated a study investigating flame retardant use in infant products that contain polyurethane foam, including car seats, nursing pillows, infant sleep positioners, portable mattresses, and changing table pads. We used advanced analytical methods to test 101 different products that were either in use by families at that time, or were purchased new. We found that more than 80% of the products contained a flame retardant we could identify at levels that were approximately 3 to 4% by weight of the foam[30]. PBDEs were found in 5% of the products tested; however, all products containing PBDEs were purchased prior to the 2005 phase out of PBDEs. The most commonly detected flame retardant identified in infant products was TDCPP, and the second most common was FM 550. From our research it appears that TDCPP is still widely used as a flame retardant in furniture and infant products. The other flame retardant chemicals identified in the infant products have little to no health data available, but are similar in structure to chemicals that have known toxicity. These points highlight what I call the "chemical conveyer belt". When one chemical is phased out, another similar chemical is often used as a replacement and we know less about its potential health effects and exposure than the chemical it replaced. History has shown that it often takes millions of taxpayers dollars and several decades of research on these new chemicals before we realize there is a health hazard. This Committee should, in my opinion, consider how this process could be reformed.

The flame retardant standard driving the use of these chemicals in infant products, and in most residential furniture, is a California flammability standard known as Technical Bulletin 117 (TB 117). TB 117 was initiated in 1975 due to increased concerns about house fires that were started by small open flames (e.g. candles). While this standard only applies to furniture sold in the state of California, it appears to have become a de facto standard across the U.S. More recently my colleagues and I have tested foam collected from 102 different couches purchased from

around the U.S. between 1985 and 2010. Our findings are very similar to the infant study mentioned above. In this case 85% of the samples contained a flame retardant chemical, even when most couches were purchased outside the state of California. While PBDEs were the most common flame retardant detected in furniture purchased prior to 2005 (the PBDE phase out date), TDCPP was again the primary flame retardant identified in samples purchased after 2005, at levels that were typically 4% by weight of the foam. Furthermore, we spent several months using very advanced analytical equipment to determine the chemical structures of unknown flame retardants detected in 10 of the samples. As with our earlier study, we could find no published health information or toxicity testing for the new flame retardant chemicals we identified in residential couches. Now that these new chemicals have been identified we can begin to measure the extent of exposure among the general public and determine whether or not any adverse health effects are associated with this exposure. Of course, it might be better public health policy to rigorously examine the safety of these compounds before they are put into the products found in the homes of hundreds of millions of Americans.

Toxicity Studies in Animals. Several review papers have been published highlighting an abundant scientific literature on effects of PBDE flame retardants collected from animal studies. These papers demonstrate that PBDEs have effects on hormone levels, reproduction potential, behavior, and learning and memory functions[31-33]. The most significant health effects in animals appear to be related to effects on hormone regulation, suggesting they can function as an endocrine disruptor. PBDEs have a chemical structure that is very similar to thyroid hormones, most notably thyroxine (T4). In laboratory animal studies, PBDE exposures have been shown to negatively affect thyroid hormone regulation most notably by decreasing levels of thyroid hormones in the blood[14,34,35]. Thyroid hormones are critical for growth and development, particularly proper brain development; therefore some limited human health studies have focused on examining associations between PBDE exposure and neurodevelopmental outcomes in children.

While a great amount of effort has been spent examining the toxicity of PBDEs, comparatively little to no research has been conducted on the newer flame retardant chemicals that are being used as PBDE replacements, and that are now found in consumer products. As mentioned earlier, TDCPP was a flame retardant used in children's pajamas during the late 1970s, and then discontinued after studies demonstrated that TDCPP was a mutagen, and therefore a suspected carcinogen. Studies conducted by the National Toxicology Program have also demonstrated that long term exposure to TDCPP in rodents results in increases in tumor formation[36]. More recent studies have also found that TDCPP may affect brain development. Using cells grown in the lab, we recently determined that TDCPP has the same potential as a restricted pesticide called chlorpyrifos, to disrupt the growth and function of young brain cells[37], key factors in brain development. In addition, in a very recent study conducted by my colleagues and I, we found that exposure to FM 550 in rodents resulted in significant changes in hormone levels, advanced puberty, altered behavior, and obesity at exposure levels that were more than 10 fold LOWER than what Great Lakes Chemical cited as the lowest dose at which adverse effects would be observed [38].

Communications Received from the General Public. Many of these human health studies have been highlighted in the news media, increasing the public's concern about exposure to these

chemicals, particularly among pregnant women. As a scientist intimately involved in these studies, I have received more than 100 email and phone call communications asking for help in locating products that are not treated with these chemicals. As stated earlier, these products are not labeled with any information indicating whether or not they are treated with flame retardant chemicals. The only way an average consumer could gather more information on chemical treatments in a specific product is to try and contact the manufacturers themselves. Unfortunately, the manufacturers do not always have a clear answer. For example, here is an excerpt of an email I received last week from a consumer trying to locate residential furniture that was not treated with flame retardants:

"I have called and called and 98% of the manufactures simply don't know anything. One says no but how do I believe them when I have another company telling me it is required in all sofas even outside of California. .... one says no we don't while the local dealer says yes we do [add flame retardants] so I get so many conflicting stories."

This example highlights the frustrations of many Americans. Despite the fact that the California residential furniture flammability standard (TB 117) only applies to furniture sold in California, most furniture manufacturers prefer to use this standard nationwide for ease of production and marketing, and thus manufacture all their products accordingly.

Through my conversations with both the media and the public I am often been asked how I reduce my exposure in my home and what types of products I use in my own home, since I myself am a mother of two young children ages 1 and 3. In my case, I avoid products which our studies have shown to be treated with flame retardants, and I have spent considerable time searching for an alternative product that is not treated. Fortunately, I have managed to find flame retardant free products for all of my baby products with the exception of our car seats, which may need to meet additional standards for automobiles. The furniture I use in my home was manufactured in Italy, and does not meet TB 117 standards. In addition to these steps, my husband and I have chosen to limit carpeting in our homes, which can be laden with flame retardants in the padding, and also leads to dust accumulation in homes. I also wash my hands and my children's hands frequently. Just like the common cold, we can reduce our exposure to these chemicals by simply washing ones hands [39]. As both a scientist and a mother, it is important to me that I reduce my family's exposure to these chemicals.

In closing I would like to urge this Committee to strongly consider legislation that would reduce our children's exposure to these chemicals, some of which are suspected carcinogens, which can be done without compromising fire safety. I have dedicated much of my scientific career to testing consumer products for these chemicals to provide information on potential sources in the home. In my opinion, these products should be labeled to indicate they are treated with these chemicals, to allow consumers a choice, particularly when it involves the use of suspected carcinogens in baby products. Lastly I would just like to note that my research has been funded by the National Institute of Environmental Health Sciences and the National Science Foundation and I thank you for considering my testimony.

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Questions from Senator Barbara Boxer:

1. Dr. Stapleton, when flame retardants persist in the environment, can they slowly breakdown into other chemicals – and, during and after fires, can they more quickly breakdown into other chemicals?

    a. Do we know if some of the chemicals that result from this process are more or less toxic than the flame retardants?

    Response: We do know that some flame retardants persist for very long times in the environment, particularly in indoor environments where they are not exposed to sunlight, water or bacteria that can help degrade them. However, some flame retardants can slowly degrade over time. At this time, we only have limited information available on the degradation rates of a few flame retardants. DecaBDE (a commercial PBDE mixture) has been studied most frequently in this regard. Studies do demonstrate that DecaBDE can slowly degrade in the environment to smaller PBDEs (that contain fewer bromine atoms) [1-3]. This is a concern as PBDEs with fewer bromine atoms have been shown to be more bioaccumulative and potentially more toxic. Furthermore, studies have also demonstrated that during exposure to sunlight and during fires, DecaBDE present in TVs can be degraded into a class of chemicals known as furans [4-6]. Furans are a class of chemicals similar in structure to dioxins, both of which are considered among the most toxic organic chemicals and they are also known to cause cancer in exposed animals. Furans are more toxic than PBDEs. The relative rates at which furans are formed depend on the type of product DecaBDE is found in, and on the environmental conditions (e.g. temperature and sunlight intensity).

    b. What are the potential public health concerns if these are also persistent and bioaccumulative?

    Response: Yes, furans are also persistent and bioaccumulative and exposure to furans can increase cancer risks among the population. However, to my knowledge, there have been no studies that have thoroughly evaluated the amount of exposure to furans during and after fires involving PBDE treated products. We know that they are formed because we can detect them in both burned materials and in soils/sediments around fires, but it is difficult to predict how much exposure occurs to the general population in surrounding areas.

2. Your testimony references a study that you helped to conduct that examined levels of PBDEs in the blood of children, and levels of those chemicals in household dust. Can you go into a little more detail about what this study tells us about the prevalence of these chemicals in homes and levels that your study found in children?

    Response: During 2009-2010 my research team conducted a study to examine toddlers' exposure to PBDEs in indoor environments [7]. We invited families with children between the ages of 12-36 months, and who resided in central North Carolina, to participate in our research study. During the study we collected blood and hand wipe samples from the children, and collected

samples of the families house dust, for PBDE testing. We found PBDEs in all house dust samples and in all blood samples analyzed. On average the levels of PBDEs in the toddler's blood were 70% higher than adults. We also found that toddlers with the highest levels of PBDEs in their blood also had the highest levels of PBDEs in their house dust and on their hands (as measured on the hand wipe samples). We believe that children are accumulating PBDEs on their hands from either direct contact with products containing PBDEs (e.g. furniture), or from contact with house dust during normal behavior. This data suggests to us that children are receiving most of their exposure from accidental ingestion of PBDEs in the indoor environment (e.g. dust exposure and hand to mouth contact). Our study and other research studies clearly demonstrate that PBDEs are found in every home, and some families may have very high levels of PBDEs in their home (parts per thousand), while others may have much lower levels in their home (parts per billion). We presume these differences are due to different sources in the home, but since products are not labeled for flame retardants, it is impossible to determine where the PBDEs originate from.

3. Dr. Stapleton, researchers from the University of California at Berkeley and the federal Centers for Disease Control and Prevention conducted a study that found that Latino children living in California have higher PBDE levels than children who live in Mexico. The study also notes that PBDEs are being phased out but that "the health consequences of these chemical replacements should be investigated and weighed against their purported fire safety benefits." Do you agree that we should investigate these alternative chemicals?

   Response: Yes, I do believe it would be in our best interest to not only conduct research on potential health effects of these alternative chemicals, but also determine how likely these alternative chemicals are to migrate out of treated consumer products. Many of the PBDE replacement chemicals are considered "additive chemicals", meaning they are not chemically bound to the product they are applied to, and are more likely to migrate out of these products over time and contaminate the environment. Give the high application rate of these chemicals in consumer products (e.g. 5-15% by weight of the product in some cases), the heavy use of these new chemicals increases concerns about human exposure to these untested chemicals and potential health effects, particularly in children, because children receive the greatest exposure to flame retardant chemicals in indoor environments [8].

   Furthermore, many of these PBDE replacement chemicals have not been tested for health effects on developing organisms. Due to a lack of available data on one current PBDE replacement known as Firemaster 550 (FM 550), my collaborators and I conducted a study to investigate the effects of FM 550 on pregnant rats. Our study found that exposure to FM 550 during pregnancy resulted in early puberty and obesity in the developing pups [9]. In addition, the exposure level that resulted in these effects were significantly lower than what the industry claims to be an exposure level at which no adverse effects would be seen. Our study highlights a need for more testing on FM 550 as data already demonstrate that the chemicals found in FM 550 are present in more than 95% of all house dust samples tested to date, implying that chronic exposure to children is occurring presently.

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Senator BOXER. Thank you very much.

And now we turn to our two minority witnesses, the first of whom is Marshall Moore, Director, Technology, Advocacy and Marketing, Great Lakes Solution, a Chemtura business.

And you can speak about the manufacture, including of flame retardants. Go ahead.

STATEMENT OF MARSHALL MOORE, DIRECTOR, TECHNOLOGY, ADVOCACY AND MARKETING, GREAT LAKES SOLUTIONS, A CHEMTURA BUSINESS

Mr. MOORE. Thank you, Senator Boxer, Senator Lautenberg, and the Committee.

Flame retardants have received a lot of attention recently, some of which is inaccurate and misleading. So, I want to be very clear. Chemtura stands by its products. And we have acted proactively with EPA and others to lead our industry in the introduction of greener alternatives because of a corporate commitment to continuous improvement. That is why we are participating fully in this hearing.

I will emphasize three points. One, flame retardants are effective in reducing the flammability of synthetic materials. Two, EPA has conducted an extensive assessment of new flame retardants to ensure that they are safe for use. And three, Chemtura acts proactively to develop new flame retardant products with improved environmental profiles.

Our scientists are working every day to find better, safer, and greener ways to mitigate the age old risk of fire. By adding flame retardants to polyurethane foam, which is highly flammable when left untreated, manufacturers have been able to comply with the nation's strictest furniture flammability standard, California Technical Bulletin 117. For over three decades, flame retardants have enabled manufacturers to meet this standard by reducing the flammability of their products.

The introduction of this standard coincided with a dramatic decrease in the number and severity of house fires according to data compiled by the National Fire Protection Association. A number of labs have replicated these results, most recently at Southwest Research Institute.

In a study funded by the National Institute of Justice, Dr. Matthew Blais tested foam treated with flame retardants to meet the California standard. He concluded, "The use of California Technical Bulletin 117 foam increases the fire safety of home furnishings by delaying the onset of free burning conditions and reducing the total energy released by the event."

Scientific data show the relative risk associated with our flame retardants is extremely low and is far outweighed by the societal benefits of this advancement that reduces the number and severity of fires.

From an environmental perspective, EPA required rigorous review of TBB, a component of Firemaster 550. This product was designed to provide the same or better flame retarding properties in furniture foam as earlier products but with an improved environmental profile. Chemtura submitted 15 studies to EPA during the assessment of TBB. These included studies designed to assess the

potential exposure of consumers and the persistence and potential for bioaccumulation. Based on these studies, our scientists concluded, and EPA agreed, TBB is less persistent and less likely to bioaccumulate than the product it replaced.

In the years that followed, Chemtura conducted additional environmental fate and toxicity studies. They indicated that the levels at which observed effects would be expected are orders of magnitude higher than the predicted exposure levels. That is, the risk is minimal.

The product was subject to Government restrictions until EPA received those studies, a process that took more than 13 years. Chemtura will be submitting 17 additional studies, all conducted for registrations in other regions, as part of EPA's TSCA Work Plan Chemicals Program. We welcome the opportunity to work with regulators to conduct a fresh, objective, and scientific review of this data as well as studies conducted by academic researchers.

Based on our experience, the evaluation of new chemical substances under TSCA has been effective and thorough. Yet, we believe that TSCA can be modernized to be more efficient, to use current scientific technologies, and to reflect our improved understanding of how chemicals interact with the human body and the environment. You have our commitment to help in this effort.

In conclusion, Chemtura has fully complied with chemical management regulations while also leading the industry in the introduction of greener alternatives. We have shown our commitment to continuous improvement by voluntarily replacing older products with new options that are better, safer, and greener.

Everyone in this room wants the same thing, reduced risk of fire, greener chemistry that results in efficient products with reduced environmental impact, and a regulatory process that promotes innovation. Chemtura is proud to have led the industry in introducing products that meet the most rigorous fire safety standards while protecting human health and the environment.

Thank you once again for the opportunity to appear before you today.

[The prepared statement of Mr. Moore follows:]

Written Testimony of Mr. Marshall Moore
Great Lakes Solutions, A Chemtura Business
Director, Technology, Advocacy & Marketing

Before the
Committee on Environment and Public Works

"Oversight of EPA Authorities and Actions to Control Exposures to Toxic Chemicals"

July 24, 2012

Good morning. I am Marshall Moore, Director of Technology, Advocacy and Marketing at Chemtura. Thank you for the opportunity to speak on behalf of our 4,300 employees. We sincerely appreciate the opportunity to share our views about proposals to reform the Toxic Substances Control Act and how improvements to the regulatory process would affect the innovative products that Chemtura manufactures, including the life-saving and injury-reducing products that we manufacture for the purpose of fire prevention. We welcome the opportunity to discuss the important contributions our innovative solutions, like our flame retardants, make to modern life.

At Chemtura, our scientists have used chemistry to make other products more durable, safer, cleaner and more efficient in a number of industries, including construction materials such as insulation, furniture, electrical and electronics, and transportation.

One area of which we are particularly proud is our scientists' work in the field of flame retardancy. Chemtura flame retardants are proven to protect lives and property by significantly reducing the risk of fire.

Flame retardants have received a significant amount of attention in recent months — some of which has been inaccurate and misleading — so I feel compelled to summarize our position in very clear terms: Chemtura stands by its products. We have acted proactively with the Environmental Protection Agency (EPA) and other agencies not only to fully comply with chemical management regulations, but also to lead the industry in the introduction of greener alternatives.

These innovations enable manufacturers to meet the strict fire-safety standards that government regulators and independent standards organizations have established to protect the public by reducing the number and severity of fires that threaten families, homes, and businesses.

In my testimony, I want to make three clear points:

1) Flame retardants are effective in reducing the flammability of synthetic materials;

2) EPA has conducted an extensive assessment of new flame retardants, such as tetrabromobenzoate (TBB), to ensure that they are safe for use;

3) Chemtura acts proactively to continually develop new flame retardant products with improved environmental profiles, and has demonstrated its willingness to cooperate with EPA in its assessment of both new and existing chemicals.

Flame Retardants are Effective

We share a common goal: reduce the number and severity of fires. In contemporary society, it is essential for manufacturers to find ways to limit the age-old risk of fire — a risk that has only increased with the introduction of modern products into our daily lives. Our scientists are working every day to find better, safer, and greener ways to do just that.

According to the National Fire Protection Association (NFPA), between 2005 and 2009, "U.S. fire departments responded to an average of 7,040 home structure fires per year in which upholstered furniture was the first item ignited. These fires caused an average of 500 civilian fire deaths, 890 civilian fire injuries, and $442 million in direct property damage."[1] We are doing our part to lower these numbers even more, but this is a significant improvement over the days that preceded the use of effective flame retardants.

By adding flame retardants to polyurethane foam — which is highly flammable when left untreated — the manufacturers of furnishings have been able to comply with a variety of standards worldwide, including those of California, which has the strictest standard in the United States. California Technical Bulletin 117, the formal name of the standard, was developed by the California Bureau of Home Furnishings through a consensus standards development process and first implemented in 1975. This regulation was intended to prevent ignition or slow the spread of the flame if the furniture is the first to ignite. When fires do occur, multiple studies show that foams treated with flame retardants burn much slower than untreated foam, giving occupants precious time to escape.

The implementation of California TB117 coincided with a dramatic reduction in upholstered furniture fires across the United States. From 1980 to 2009, upholstered furniture fires dropped 84 percent, from 36,900 to 5,900, according to NFPA data.[2] Deaths caused by furniture fires fell by 67 percent.[3] During the same period, furniture fires from all sources fell dramatically.[4]

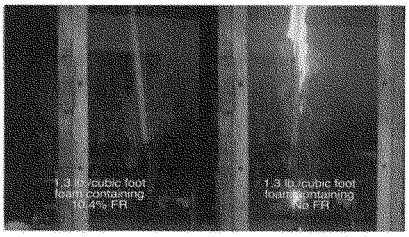

Figure 1 Side-by-side test of FR and non-FR foam against open flame in Chemtura lab

The statistics are just as impressive in the United Kingdom. A December 2009 report commissioned by the Consumer and Competition Policy Directorate of the Department for Business, Innovation and Skills, examined the effectiveness of that country's flammability standards for furniture and furnishings (F&F). Overall, the report said: "Both the number and lethality of F&F fires rose before the introduction of the regulations and fell afterwards. . . . The reduction in the rate and lethality of F&F fires was estimated to equate to 54 lives saved per year, 780 fewer casualties per year and 1,065 fewer fires per year in the period 2003-2007."[5]

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[1] http://www.nfpa.org/assets/files/PDF/UpholsteredFactSheet.pdf
[2] http://www.nfpa.org/assets/files/MbrSecurePDF/OS.Upholstered.pdf
[3] Ibid.
[4] Ibid.
[5] http://www.bis.gov.uk/files/file54041.pdf

A 1989 study conducted by the Commerce Department's National Bureau of Standards at the request of an industry group compared fire-retarded (FR) and non-fire-retarded (NFR) products in large-scale fire testing. Here is a verbatim quote from the government's report on its study:

> *The impact of FR (flame retardant) materials on the survivability of the building occupants was assessed in two ways: (1) Comparing the time to untenability in the burn room; this is applicable to the occupants of the burn room. (2) Comparing the total production of heat, toxic gases, and smoke from the fire; this is applicable to occupants of the building remote from the room of fire origin.*
>
> *The time to untenability is judged by the time that is available to the occupants before the earlier of (a) room flashover, or (b) untenability due to toxic gas production occurs. For the FR tests, the average available escape time was more than 15-fold greater than for the occupants of the NFR room. With regard to the production of combustion products,*
>
> - *The amount of material consumed in the fire for the FR tests was less than half the amount lost in the NFR tests.*
> - *The FR tests indicated an amount of heat released from the fire which was 1/4 that released by the NFR tests.*
> - *The total quantities of toxic gases produced in the room fire tests, expressed in "CO equivalents," were 1/3 for the FR products, compared to the NFR ones.*
> - *The production of smoke was not significantly different between the room fire tests using NFR products and those with FR products.*
>
> *Thus, in these tests, the fire retardant additives did decrease the overall fire hazard of their host products.*
>
> *The above conclusions are specifically pertinent only to the materials actually examined. Thus, while it has been demonstrated that very significantly enhanced fire performance can be obtained with fire retarded products, such improvements are by no means to be automatically expected from all fire retarded products. Instead, it will still be necessary to test and evaluate proposed new systems individually. However, these tests do show that the proper selection of fire retardants can markedly improve the fire safety of specific products.*[6]

Flame retardants remain effective. In a recent study funded by the National Institute of Justice at the U.S. Justice Department, Dr. Matthew Blais, the director of the Fire Technology Department at the non-profit Southwest Research Institute, tested materials treated with flame retardants in order to meet the strictest U.S. furniture flammability standard. He concluded:

> *Urethane foam filled furnishings have the potential for contributing tremendous energy to a fire and when not protected with flame retardants (FR) can lead to rapid transition from incipient fire to a free burning condition. The time to reach flashover (spread to the rest of the room) in a recent study performed at Southwest Research Institute (SwRI®) by Janssens et al. was as short as 200 seconds from time of ignition. The addition of flame retardant covering over the foam adds a layer of defense that delays transition to flashover to almost 800 seconds from initiation. The additional use of CA TB 117 rated urethane foams prevented sustained burning when a small ignition source was used. In cases where the CA TB 117 foams are used with flammable coverings, significant reductions in both peak Heat Release Rate (HRR) and total HRR were measured and a significant delay in reaching the free burning condition was observed. The impact of adding FR to the covering material and urethane foams adds defense in depth to the furnishing that undoubtedly saves lives.*[7]

That is up to 10 additional minutes for an individual or family to escape to safety.

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[6] http://fire.nist.gov/bfrlpubs/fire88/PDF/f88003.pdf

[7] Blais, Matthew. *The Utility of CA TB 117, Does the Regulation Add Value?* Southwest Research Institute, 2012.

Flame Retardants have Undergone Extensive Scientific Study

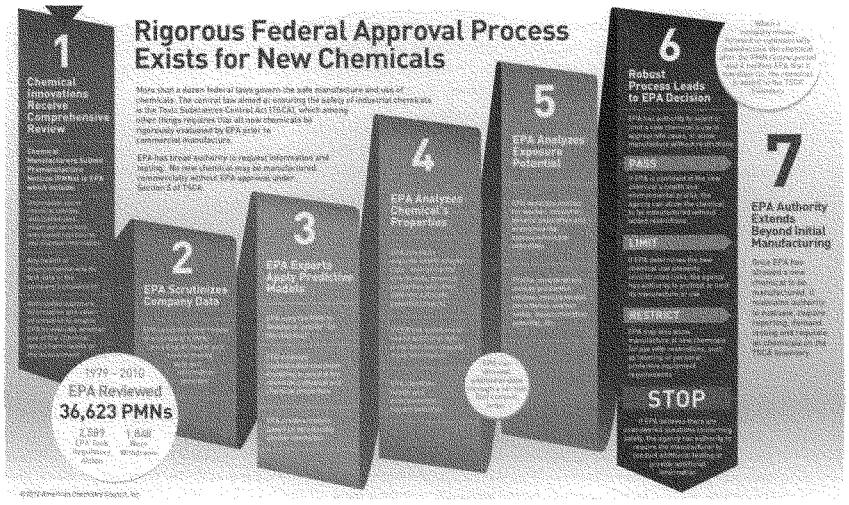

Figure 2 ACC illustrates the rigorous review process for new chemicals

Our flame retardants work as intended. They have also undergone rigorous testing and meet the standards set by government scientists and regulators, as well as those set forth by our customers. The U.S. EPA requires extensive scientific review before it authorizes the production of flame retardants, which are among the most carefully studied chemicals used in consumer products. Our Firemaster® 550 flame retardant led our industry in an innovative move to greener chemicals.

EPA required a rigorous review of 2,3,4,5-tetrabromo-ethylhexylbenzoate (TBB), the brominated component of Firemaster 550. In keeping with our corporate commitment to leading the move toward greener innovation, this product was developed to provide the same or better flame retarding properties as PentaBDE in furniture foam, but with an improved environmental profile. In total, 15 studies were submitted to EPA during the course of the assessment of TBB. These include studies specifically designed to assess the potential exposure of consumers to the substance, as well as the persistence and potential for bioaccumulation. All of these studies were conducted at independent accredited laboratories following standardized methods. Based on these studies our scientists concluded — and the EPA agreed — TBB is less persistent and less likely to bioaccumulate than the product it replaced. Perhaps the best public summary of this assessment is shown in the final report of EPA's Design for the Environment project titled *Furniture Flame Retardancy Partnership*. In the 2005 final report, TBB is shown to have low persistence and low bioaccumulation potential.

EPA oversight did not stop there. In the years that followed, we conducted additional studies on environmental fate and toxicity. Until those studies were provided to EPA, we were subjected to a time limit during which we were allowed to produce the product — a process that took more than 13 years.

The result of an assessment of the toxicity and environmental fate studies provided to EPA indicated the levels at which observable effects would be expected are orders of magnitude higher than the predicted exposure levels.

In addition to the 15 studies that Chemtura submitted to EPA, 17 additional studies have been conducted on this compound for the purpose of registrations in other regions. Chemtura will be submitting these studies to EPA as part of the Toxic Substances Control Act (TSCA) Work Plan Chemicals program.

We welcome the opportunity to work with federal regulators to conduct a fresh, objective, and scientific review of this data as well as studies conducted by independent academic researchers. Scientific data show the relative risk associated with our flame retardants is extremely low, and is far outweighed by the societal benefits of an innovation that reduces the number and severity of fires that can threaten lives and property.

Regulatory Reform is Needed

Chemtura supports efforts to reform TSCA. It is our experience with flame retardants that the current process for the evaluation of new chemical substances under TSCA has been effective and thorough. The review of substances by EPA is done in a way that effectively minimizes the risk of adverse environmental impact, while at the same time not undermining the competitiveness of U.S. manufacturers in global markets.

That said, our nation's primary chemicals management law must be updated to keep pace with scientific advances and to ensure that chemical products are safe for their intended use — while also encouraging innovation.

TSCA has been protective of human health and the environment, but we recognize that public confidence in the regulatory system has eroded in recent years. This lack of confidence has resulted in regulatory inconsistencies at the state level and caused undue concern among consumers, often based on the rhetoric of activists rather than published research of scientists. This is not sustainable.

We all share the desire for a modern regulatory system that gives everyone — consumers, manufacturers, and others — confidence in the products of chemistry that have enabled the development of modern society and preserved the role of the United States as the world's leading innovator. We believe TSCA should be modernized to be more efficient, to use current scientific technologies, and to reflect our improved understanding of how chemicals interact with the human body and the environment.

Despite the need to update TSCA, there is broad agreement that EPA's program to evaluate and approve new chemicals before they are manufactured and commercialized works well. Every new chemical, including TBB, has had to go through a systematic assessment of human health and environmental risks before a company can begin commercial production or import. EPA has full authority — and uses it — to collect information, demand additional information and testing, limit uses to manage potential risks, and deny the application for manufacture if the agency cannot establish that the new product will not pose an unreasonable risk of injury to health or the environment. Existing chemicals and those in long-time use are subject to ongoing scrutiny, with the federal government maintaining continuous reporting, testing, and evaluation authority under TSCA, and as many as 12 other federal laws.

The flame-retardant industry has also shown a commitment to self-regulation through its own product stewardship initiatives. At Chemtura, for example, we engage in a process of continuous improvement. That was why we developed a greener alternative and voluntarily phased out production of PBDEs. We also work with our customers to minimize the potential release of flame retardants to the environment

through the Voluntary Emissions Control Action Program (VECAP), an award-winning product stewardship program developed by the European Flame Retardants Association (EFRA) and the Bromine Science and Environmental Forum (BSEF).

Going forward, EPA's decisions must consistently be based on a strong scientific framework that uses modern technology, proven safety testing methods, and high-quality data. Chemtura has always welcomed the opportunity to work with EPA in its efforts to conduct objective, science-based assessment of chemicals, including flame retardants. For us it means continuing to provide our company's scientific data and other information regarding flame retardants in support of the Design for the Environment projects, and the EPA's upcoming assessments of its Work Plan. This will provide the agency with the facts it needs to conduct an objective scientific review that sets a direction for the future use and study of the products.

Since scientific understanding is always evolving, a regulatory system that can adapt to advances in science and technology will help ensure the safe use of the essential, innovative products made possible by chemistry, as well as maintain American competitiveness in this important arena.

Chemtura is Committed to Continuous Improvement

We are proud of the fact that Chemtura leads our industry in the introduction of new flame retardants through Greener Innovation that maintains the fire safety efficacy that enable manufacturers to meet fire prevention standards in this country and around the world. Reducing the number and severity of fires that threaten families, homes, and businesses — efficiently and safely — is common ground for all of us.

As a company, we have shown our commitment to continuous improvement in our scientific endeavors by voluntarily replacing older products with newer options that are better, safer, and greener. EPA has required rigorous review of these products, which have been found to have an improved environmental profile when compared to their predecessors.

Moreover, we all share the desire for a modern regulatory system that evokes confidence in the products of chemistry that have enabled the development of modern society and preserved our national competitiveness. We believe TSCA can be modernized to be more efficient, to use current scientific technologies, and to reflect our improved understanding of how chemicals interact with the human body and the environment. You have our commitment to help in this effort.

Thank you.

Marshall D. Moore
Director, Technology, Advocacy & Marketing

Great Lakes Solutions, A Chemtura Business
1801 US Highway 52 West
West Lafayette, IN 47906

765-497-6127 **tel**
765-497-6395 **fax**

July 25, 2012

The Honorable Barbara Boxer
Chairman
Senate Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable James Inhofe
Ranking Member
Senate Committee on Environment and Public Works
456 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Boxer and Ranking Member Inhofe:

Thank you for the opportunity to participate in Tuesday's Environment and Public Works Committee hearing on proposals to reform the Toxic Substances Control Act (TSCA).

I respectfully request the opportunity to submit the following information in response to questions that arose during the hearing:

EPA Authority

During the first panel, there appeared to be some confusion about EPA authorities and whether or not the agency exercised its authority under section 5 of TSCA to require persistence or bioaccumulation data from Chemtura during the regulatory review of TBB. At the request of EPA, Chemtura performed persistence and bioaccumulation studies which were provided to and reviewed by EPA and demonstrated that TBB is less persistent and less bioaccumulative than prior products.

Relationships with Other Groups

Chemtura works with many stakeholders who share our interest in fire safety and greener chemistry. Much of that work is done through industry organizations such as the American Chemistry Council, North American Flame Retardant Alliance, Bromine Science and Environmental Forum, and others with whom we are proud to be associated. As a company and through these organizations, we work with legislators, regulators and others to meet the most rigorous fire safety and environmental standards.

We do not perceive any conflict between Chemtura's role as a manufacturer of flame retardants and support for independent organizations that promote fire safety. The function of Chemtura's flame retardant products is to enhance fire safety and its scientists have unique

expertise in the field of fire science. As such, it is natural for the company and its employees to support organizations that share the same concerns about fire safety and flammability standards. The common thread that runs through these activities is a shared goal of reducing the number and severity of fires that threaten lives and property.

As I said in my testimony, Chemtura is also a founding member of Citizens for Fire Safety (CFFSI). Chemtura holds a seat on the CFFSI Board, but our company has never been involved in the day-to-day activities of that organization. We were shocked to learn of the allegations reported regarding the professionals who were hired to run CFFSI, including the claims they had engaged in activities that would be contrary to our principles.

Chemtura has a very high ethical standard and takes these allegations seriously. We are conducting a review of all of our company's flame-retardant advocacy activities involving third parties and consultants including CFFSI, and Chemtura is not participating in any CFFSI activities pending outcome of that review.

Compliance with EPA Regulations

Chemtura complied with all regulatory requirements under the Premanufacture Notice requirements for new chemicals under section 5 of TSCA, including performing and reporting the results of all tests EPA required throughout the process of evaluating TBB.

A question arose during the hearing about the $55,901 fine that Chemtura paid after the Environmental Protection Agency discovered a clerical error during a routine audit of Chemtura's Inventory Update Reports, which requires Chemtura to provide information on approximately 200 different chemicals.

Of the approximately 200 chemicals reported, Chemtura inadvertently recorded inaccurate volume information for two chemicals in 2002 and inadvertently omitted volume information for those two chemicals in 2006. After this omission was brought to the company's attention, Chemtura corrected its records and cooperated with EPA during its review process, prompting the agency to reduce the fine it had originally levied.

Thank you again for giving Chemtura the opportunity to participate in this Committee hearing.

Sincerely,

Marshall D. Moore
Director, Technology, Advocacy & Marketing

Senator BOXER. Thank you, sir.

And now we turn to the second minority witness, William Rawson, Partner, Chair, Environment, Land and Resources Department, Latham & Watkins, attorney for chemical manufacturers including of flame retardants.

Welcome.

STATEMENT OF WILLIAM K. RAWSON, PARTNER AND CHAIR OF THE ENVIRONMENT, LAND AND RESOURCES DEPARTMENT IN WASHINGTON, DC, LATHAM & WATKINS

Mr. RAWSON. Madam Chair and distinguished members of the Committee, good morning. Thank you for inviting me to testify.

I have co-authored a book on the Toxic Substances Control Act and have practiced environmental law for 25 years. I have been asked to testify today by Albemarle Corporation, a domestic producer of flame retardants, and ICL-IP, an Israeli company that imports flame retardants.

I have a strong appreciation for EPA's mission and have worked closely with many EPA managers and staff over the years. I have great respect for their efforts in support of EPA's mission.

All major stakeholders agree that amendments to TSCA are needed. To make progress toward amendments, we need to find common ground. Executive Order 13563, signed by President Barack Obama last year, states a regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. TSCA amendments should meet those objectives.

The Executive Order directs each agency to "propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs" and to "tailor its regulations to impose the least burden on society consistent with obtaining regulatory objectives."

My testimony focuses on TSCA Section 5, which governs approval of new chemicals; Section 4, which governs testing of existing chemicals; and Section 6, which provides authority to regulate existing chemicals.

The strength of Section 5 lies in its flexibility, which allows EPA to raise or lower the bar according to the properties of each proposed new chemical. Since TSCA was enacted in 1976, the company seeking approval of a new chemical in every case has either agreed to EPA's data requirements and restrictions or withdrawn its premanufacture notice. Several thousand chemicals have been approved with restrictions or not approved at all. There has been no litigation under Section 5. Section 5, in my judgment, is doing a good job of meeting the objectives of the Executive Order.

The Senate bill would mandate a new round of EPA review for every new use of a previously approved chemical and every significant increase in use of an existing chemical. The implications for EPA's overburdened resources, for EPA's ability to prioritize, and for industry's ability to innovate would be very significant.

Section 4. EPA has two ways under TSCA Section 4 to require toxicity testing of existing chemicals, a risk-based approach and an exposure-based approach. Case law shows that the burden is very low. The Section 4 criteria, in my judgment, provide a sound basis

for deciding what testing is necessary to protect human health and the environment.

Why are there not more test rules? One reason is that industry conducts a large amount of testing voluntarily. Also, many chemicals have been evaluated for testing under TSCA and have been determined to be a low priority for testing or not to need any testing at all.

The Senate bill would not require EPA to consider potential for exposure before determining the need for testing. EPA has stated, "The level, frequency, and duration of exposure of a chemical should always be considered when determining the necessity of additional testing."

Section 6. The asbestos rulemaking did not fail because of the statute. It failed because of errors in the rulemaking. This is explained in my testimony. Section 6 requires the EPA to adopt the "least burdensome requirements necessary to address the identified risks. The Executive Order directs agencies to use the least burdensome tools for achieving regulatory ends."

The unreasonable risk standard in Section 6 is not unique to TSCA. The Federal pesticide statute has a similar standard. The Executive Order directs agencies to "take into account benefits and costs, both quantitative and qualitative." The proposed reasonable certainty of new harm standard and proposal to require EPA to consider exposure from all sources, including those outside of EPA's jurisdiction, is not workable for all chemicals regulated under TSCA.

The Senate bill would make a decision by EPA that a chemical fails to meet the safety standard immune from judicial challenge. Even arbitrary and capricious decisionmaking could not be overturned. That is very troubling.

All stakeholders recognize the need for EPA to prioritize its resources. A rational prioritization scheme with reasonable timelines would give the public greater confidence that significant risks are being addressed in a systematic and timely manner.

We need to understand which perceived shortcomings of TSCA derive from the statute and which derive from implementation. Proposed solutions should match the problems. Amendments should produce better decisions, not just easier decisions.

The companies have committed voluntarily to end production and importation of Deca-BDE without EPA taking any action under TSCA Section 6. Substantial testing has been conducted by the companies without the need for any test rule under TSCA Section 4. The companies support EPA's efforts to promulgate a significant new use rule under TSCA Section 5 that would apply to imported articles containing Deca-BDE.

In conclusion, notwithstanding the voluntary phase-out, the companies believe that Deca-BDE is a safe flame retardant. Health Canada recently released a draft health assessment document——

Senator BOXER. Mr. Rawson, will you wrap up, please?

Mr. RAWSON. May I just complete the last sentence, please?

Senator BOXER. Sure.

Mr. RAWSON. Health Canada recently released a draft health assessment document that found adequate margins of exposure including for children.

Thank you.
[The prepared statement of Mr. Rawson follows:]

WRITTEN TESTIMONY OF WILLIAM K. RAWSON

PARTNER AND CHAIR OF THE ENVIRONMENT,
LAND & RESOURCES DEPARTMENT IN WASHINGTON, D.C.

LATHAM & WATKINS

BEFORE THE

COMMITTEE ON ENVIRONMENT & PUBLIC WORKS

OF THE

UNITED STATES SENATE

JULY 24, 2012

Madam Chair, distinguished members of the Committee and staff – good morning. Thank you for inviting me to testify today on the topic of EPA's legal authorities and activities to assess exposures and risks to toxic chemicals, including flame retardants. I hope my testimony will prove useful to the Committee.

I am a partner in the law firm of Latham & Watkins and chair its environmental practice in Washington, D.C. I have co-authored a deskbook on the Toxic Substances Control Act (TSCA) published by the Environmental Law Institute, and have been involved in numerous rulemaking proceedings and other activities arising under various sections of TSCA. I have been asked to testify today by Albemarle Corporation, a domestic producer of flame retardants, and ICL-IP, an Israeli company that produces and imports flame retardants. My testimony will reflect my experience representing and counseling companies and trade associations on issues arising under TSCA and other chemical regulation statutes over the last 25 years.

My testimony will focus primarily on EPA's experience implementing its authorities under TSCA. It is important to keep in mind, however, that TSCA is only part of the story. EPA regulates the use, release and disposal of chemical substances under many other environmental statutes. Other federal agencies, including OSHA, FDA and CPSC, also have substantial responsibility for ensuring the safe handling and use of chemicals under their respective statutory authorities.

Additionally, chemical manufacturers have implemented various voluntary initiatives and product stewardship programs to support the safe manufacture and use of their products. Many of the industry's voluntary initiatives have been undertaken in collaboration with EPA and other stakeholders. These initiatives and product stewardship programs help meet the objectives of TSCA.

I also would like to express strong appreciation for EPA's mission. I have worked closely with many EPA managers and staff over the years on numerous challenging issues, and have great respect for their efforts in support of EPA's mission.

TSCA

All major stakeholders appear to agree that amendments to TSCA are needed. Stakeholders have divergent views, however, about what needs to be fixed and why. To make progress toward amendments, we need to find common ground.

A useful starting point for analysis is Executive Order No. 13563, signed by President Barack Obama on January 11, 2011. That EO states: "Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation." TSCA amendments should meet those objectives.

The EO also states that our regulatory system must "identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative." EO No. 13563 directs each agency to "propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs." It compels each agency to "tailor its regulations to impose the least burden on society, consistent with obtaining regulatory objectives." One possible framework for evaluating proposed amendments to TSCA, then, would be to ask how well the legislative proposals would promote the objectives stated in the President's Executive Order.

I will focus my testimony on three sections of TSCA: section 5, which governs approvals of new chemicals; section 4 which governs testing of existing chemicals; and section 6 which provides authority to regulate existing chemicals.

Section 5. EPA has taken a flexible approach to data requirements for new chemicals, in some cases requiring very little information, and in other cases requiring more information. EPA has imposed restrictions on manufacture and use where it has considered restrictions necessary to protect health or the environment. While companies often negotiate over data requirements or proposed restrictions, in every case since TSCA was enacted in 1976, the company seeking approval of a new chemical has either agreed to EPA's data requirements and restrictions, or withdrawn its premanufacture notice. Several thousand chemicals have either been approved with restrictions or not approved at all. There has been no litigation under TSCA section 5.

The strength of §5 lies in its flexibility. Chemicals are not all alike. Some can very easily be determined to pose low risks. Others require more data and closer scrutiny, and may require restrictions to ensure safe use. The flexibility in §5 allows EPA to raise or lower the scrutiny, and raise or lower the restrictions, according to the properties of the chemical.

I believe Section 5 is doing a reasonably good job meeting the multiple objectives of EO 13563. In my view, those who were involved in the enactment of TSCA in 1976 should be pleased with what has been accomplished under Section 5. This section fundamentally changed how companies that manufacture chemicals bring new products to market.

Under the Senate bill – the Safe Chemicals Act of 2011 -- every new use of a previously approved chemical, and every significant increase in use of an existing chemical, would require another round of EPA review. Under the current statute, EPA has authority to determine when a new use would be sufficiently significant to require another round of review, based on consideration of relevant factors. The regulatory burdens associated with requiring new review for every new use, and every significant increase in use, would be enormous. The implications of the Senate proposal for EPA's overburdened EPA resources, for EPA's ability to prioritize, and for industry's ability to innovate, would be very significant.

Section 4. EPA has two ways under TSCA to require toxicity testing of existing chemicals. The first requires EPA to find that a chemical "may present" an unreasonable risk. The second is an exposure-based approach, where EPA can base testing requirements on production volume and a finding of significant or substantial human exposure or substantial releases to the environment. In each case, EPA must also find that existing data are insufficient to evaluate potential risks, and that the specific proposed testing is necessary to evaluate potential risks. Case law shows that the burden is very low. There is no Catch-22, as some have suggested. The "may present" a risk finding can and has been met with very limited toxicity data and only circumstantial evidence of potential exposure, such as, for example, that a chemical is handled in the workplace.

I believe the TSCA §4 criteria provide a sound basis for deciding what testing is necessary to protect human health and the environment. These criteria are appropriate not only for test rules under TSCA, but for industry decisions about what testing to conduct voluntarily.

Why aren't there more test rules? One reason is that industry conducts a large amount of testing voluntarily, without the need for any rulemaking action by EPA. Also, many chemicals have been evaluated for testing under TSCA and have been determined to be a low priority for testing or not to need any testing at all. The volume of testing and the amount of information available to EPA is not accurately measured by counting the number of test rules and section 4 testing consent orders.

There have been implementation issues with section 4 that have caused a number of rulemakings to get bogged down. I believe a greater willingness on EPA's part to use tiered approaches to testing would have helped resolve some of the disputes that have arisen in the past.

The Senate bill would not require EPA to consider potential for exposure before considering the necessity of testing. EPA has stated expressly in the Federal Register that: "The level, frequency, and duration of exposure to a chemical should always be considered when determining the sufficiency of existing data and the necessity of additional testing." One might ask, would it be appropriate to eliminate testing criteria that EPA has expressively stated are appropriate?

The goal of amendments should not be to make it easier for EPA to impose testing requirements. The goal should be to ensure that statutory criteria produce scientifically-sound and ethical testing decisions. If the current criteria do that, changes to the criteria are not needed. The emphasis should not be on the number of test rules that have been promulgated, but on

ensuring that EPA has the information it needs to perform its risk management functions, whether that information is gained through test rules, voluntary testing initiatives, or otherwise.

Section 6. Very few regulations have been promulgated under §6. That is not necessarily the right metric for evaluating the adequacy of the statute. Rulemakings take time and money. If product stewardship and/or voluntary initiatives render formal action under §6 unnecessary, that should be considered a good outcome. Nevertheless, I acknowledge that there has been an erosion of public confidence in TSCA, and in particular section 6. So we must ask: how can that be addressed, and what changes might improve public confidence in TSCA?

I will first address the failed effort to ban uses of asbestos, which has been cited as evidence that the evidentiary burden EPA must meet under section 6 is too high. A careful reading of the court's decision overturning portions of the asbestos ban shows that EPA made procedural and substantive errors of a nature that would require any final rule under any environmental statute to be set aside. EPA did not give proper public notice of a key element of its exposure analysis, that in some cases "completely altered" EPA's assessment, until after the hearings were closed. [1] In the case of asbestos-containing friction products (primarily replacement drum and disk brakes),[2] which accounted for "the lion's share of the proposed benefits of the asbestos regulation," a study commissioned *by EPA* raised significant concerns about the effectiveness of substitute products. One of the study authors testified that the "replacement/substitution of asbestos-based with non-asbestos brake linings will produce grave risks," and that "'the expected increase of skid-related highway accidents and resultant traffic deaths would certainly be expected to overshadow any potential health-related benefits of fiber substitution.'"[3] Other equally significant errors are noted in the court's opinion. The court ruling certainly was disappointing to EPA, which had spent 10 years on the asbestos rulemaking, but the court's decision should not be misunderstood. The asbestos rulemaking failed not because of the statute, but because of errors in the rulemaking.

I believe the failure of the asbestos rulemaking has led to an overstatement of the burdens associated with promulgation of a §6 rule. EPA successfully promulgated several §6 rules before the failed asbestos effort, without becoming embroiled in legal challenges, and without conducting a quantitative risk assessment for every alternative control measure. I believe we should look at that experience before concluding that section 6 can never work.

Section 6 requires EPA to adopt the "least burdensome requirements" necessary to address the identified health or environmental risks. This precludes a ban of a product if a less burdensome approach would protect human health and the environment. Recall that EO 13563 directs agencies to use the "least burdensome tools for achieving regulatory ends."

The "unreasonable risk" standard in section 6 standard is not unique to TSCA. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires EPA to consider "any unreasonable risk to man or the environment" and take "into account the economic, social, and

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1 *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201, 1212-13 (5th Cir. 1991).

2 The court's opinion related to after-market brakes and the difficulty of installing non-asbestos replacement brakes in vehicles designed to use asbestos brakes. At the time, most new cars were already engineered for non-asbestos brakes.

3 *Id.* at 1224 n. 25 (citing written testimony).

environmental costs and benefits of the use of any pesticide." EO 13563 similarly directs agencies to "take into account benefits and costs, both quantitative and qualitative."

The Senate bill would apply a "reasonable certainty of no harm" safety standard, which EPA uses for food-use pesticides and FDA uses for food contact materials. The bill would require EPA to consider aggregate exposure from all sources, including those outside its jurisdiction. The level of effort that would be required and implications for EPA resources are enormous. Application of this standard to all chemicals regulated under TSCA, regardless of their uses and physical, chemical and toxicological properties, would appear unrealistic.

The Senate bill would provide that an EPA decision that a chemical fails to meet the safety determination would be immune from judicial challenge. Even arbitrary and capricious decision-making could not be overturned. I find that a very troubling concept.

Section 6 of TSCA places the burden on EPA to demonstrate the need for regulation. This is not unique. When EPA promulgates an air quality or emission standard under the CAA, for example, it typically carries the burden of demonstrating the need for the level of protection and/or specific control measures that are proposed. Courts typically give EPA wide latitude to make these kinds of judgments. While the burden should be on industry to develop the information EPA needs to perform its risk management functions, it is not unreasonable, nor out of line with other environmental statutes, to expect EPA to support a proposed regulation under TSCA with good science.

All stakeholders recognize the need for EPA to prioritize its resources. I believe a rational prioritization scheme with reasonable timelines would give greater confidence to the public that significant risks are being addressed in a systematic and timely manner. I offer this as an example of an important area where all stakeholders might be able to get together, and craft a more comprehensive approach to risk management under TSCA.

To conclude my general remarks about TSCA, all stakeholders agree TSCA amendments are needed. We need to understand which perceived shortcomings derive from the statute, which derive from implementation, and make sure the proposed solutions match the problems. Amendments should produce better decisions, not just easier decisions. I cite the EO because I believe TSCA should live by the same principles that govern other statutes and fundamentally should remain risk-based. Important risk management decisions under TSCA should remain subject to judicial review, just as occurs under other environmental statutes.

DecaBDE

I would like to offer a few comments about EPA activities regulating decaBDE, one of the polybrominated diphenyl ethers, under TSCA.

The three major producers and importers of decaBDE in December, 2009 submitted letters to EPA committing to phase out production and importation over a four year period. Some uses could be phased out relatively quickly; some require much longer lead times, and for some even the four-year phase-out might be very challenging or might yet prove infeasible.

EPA has proposed to issue a Significant New Use Rule (SNUR) under TSCA section 5 that would apply to imports of articles containing decaBDE, and also has proposed to require testing of any companies that wish to continue manufacture or import of decaBDE or articles containing decaBDE. The three companies that submitted voluntary commitments to discontinue production and importation of decaBDE generally support these regulatory proposals.

Thus within a reasonable period of time, it appears that manufacture and use of decaDBE in the United States will have been ended, without any action under TSCA section 6. Having said that, I wish to dispel some misunderstandings about decaBDE, and make clear that there has been no failure of TSCA with respect to decaBDE.

First, DecaBDE has been extensively tested. Much of the toxicity testing has been conducted voluntarily by industry and made publicly available, without the need for any test rule under TSCA. A substantial amount of exposure information is available as well.

Second, the available test data and exposure information supports the conclusion that decaBDE can be used safely as a flame retardant. Levels that have been detected in humans are far below levels that might present a concern. Potential exposures from dust are far below levels that might present a concern. DecaBDE does not accumulate in the body. Health Canada recently released a draft health assessment document that found adequate margins of exposure for the most highly exposed age groups of children.

Third, much of the concern about decaBDE originated with a study that used a novel protocol and that has been shown in the published literature to have significant flaws. EPA used this study in 2008 to calculate a safe daily exposure level. Since then the companies funded a much more robust study, following internationally-accepted and EPA-approved protocols, that failed to replicate the findings of the earlier, flawed study. This robust guideline study was published in the peer-reviewed literature in 2011. This study and other published literature support a considerably higher safe daily level than EPA has calculated. The National Academy of Sciences in 2004 calculated a safe daily level that is approximately a 1000-fold higher than the level calculated by EPA. The producers believe the safe daily level calculated by NAS is a scientifically sound value.

Fourth, the companies agreed to sponsor DecaDBE under EPA's Voluntary Children's Chemical Evaluation Program (VCCEP). That effort ended at the end of Tier 1 when EPA and the companies did not reach agreement on whether certain additional environmental fate and transport testing was needed. EPA's testing requests to the companies were rendered moot by their decision to phase out production. However, at the same time, the companies conducted the guideline study described above, without any need for a test rule under TSCA.

Fifth, the companies voluntarily committed to stop production of decaBDE not because they thought the product posed significant risks to health or the environment. Concerns had been raised in the marketplace by state ban bills, and by the flawed study described above. The companies responded to those concerns.

Sixth, CPSC has not conducted any tests that call into question the efficacy of decaBDE as a flame retardant. Rather, a very robust literature supports the use of flame retardants like

decaBDE to slow the spread of flames and increase escape time, and thereby to save lives, not just in household furniture but in many other applications, including electronics, aviation and other transportation.

In summary, the companies committed to end production and importation of decaBDE without EPA taking any action under TSCA section 6. Substantial testing has been conducted by the companies without the need for any test rule under TSCA section 4. The companies support EPA's efforts to promulgate a SNUR under TSCA section 5 that would apply to imported articles containing decaBDE.

I hope my testimony is helpful to the Committee.

Thank you.

SUPPLEMENTAL WRITTEN TESTIMONY OF WILLIAM K. RAWSON

PARTNER AND CHAIR OF THE ENVIRONMENT,

LAND & RESOURCES DEPARTMENT IN WASHINGTON, D.C.

LATHAM & WATKINS

BEFORE THE

COMMITTEE ON ENVIRONMENT &PUBLIC WORKS

OF THE

UNITED STATES SENATE

JULY 24, 2012

Senator Boxer:

Q. Do you agree that chemical manufacturers should have to prove through unbiased studies that their products are safe for pregnant women, for infants and for children before they can sell those chemicals in the US?

A. The answer in principle is yes, but the answer requires explanation. EPA's data requirements for new chemicals should be designed to ensure safe use for everyone, including, of course, infants, children and pregnant woman. Companies that submit requests for approval of new chemicals should meet those information requirements, which is why the answer in principle is yes. Further, if restrictions are necessary to ensure safe use, those restrictions should be put in place, as happens often with new chemicals.

However, as stated in my initial written testimony, the strength of section 5 lies in its flexibility. Some chemicals can be determined not to pose unreasonable risks with very little information. Some chemicals, because of their physical or chemical properties, require more information. Some chemicals require restrictions to ensure safe use. Others do not. Recognizing this, under the current law, EPA has taken a flexible approach to data requirements and restrictions applied to new chemicals. Since TSCA was enacted, every time a chemical manufacturer has sought approval for a new chemical, it has either met EPA's data requirements or restrictions, or the chemical manufacturer has withdrawn its request for approval. That should continue.

If the question is intended to suggest the same amount of data should be required for all chemicals, that would not be appropriate, as the current flexible approach is scientifically more appropriate. Also, there are some chemicals that by regulation do not require prior EPA approval, because their properties or uses are such that prior EPA approval is not considered necessary, If the question is intended to imply that those exemptions should be eliminated, that would not be appropriate.

It is not clear what is meant unbiased research. It is a policy of this country, stated in section 2 of TSCA, that companies that manufacture and process chemicals should develop the data to support assessments of their chemicals. Toward that end, chemical manufacturers typically sponsor studies following EPA-approved test guidelines and applying Good Laboratory Practices. We consider such industry-funded research to be unbiased. If the question is intended to imply that industry-funded research should not be used to support assessments of new chemicals, that would not be appropriate.

Senator BOXER. Thank you, Mr. Rawson.

Our final witness is Tony Stefani, President, Founder of San Francisco Firefighters Cancer Prevention Foundation. He is a majority witness. He is a cancer survivor. He is going to discuss local efforts to help firefighters who are exposed to chemicals during and after fires including with medical monitoring.

Welcome.

STATEMENT OF TONY STEFANI, FOUNDER, PRESIDENT, SAN FRANCISCO FIREFIGHTERS CANCER PREVENTION FOUNDATION

Mr. STEFANI. Thank you, Chairman Boxer, and good morning.

My name is Tony Stefani. I am a retired captain from the San Francisco Fire Department with 28 years of service. I would like to begin by giving you a brief history of myself and our foundation.

I spent the last 13 years of my career as a captain at Rescue 1, I am proud to say one of the busiest companies in the United States. After 27 years on the job, I was diagnosed with transitional cell carcinoma, a rare form of cancer, in my right renal pelvis. I was told by my physician at UCSF it is normally found in people that are exposed to chemicals or in the chemical industry.

During my treatment and recovery, two more firefighters from Station 1 contracted transitional cell carcinoma, only a more common form, bladder cancer. It also seemed like every month we were going to a funeral of another firefighter that had succumbed to some form of this hideous disease.

In 2006, with the complete support of the department's administration and Firefighters Local 798, I formed a nonprofit foundation, the San Francisco Firefighters Cancer Prevention Foundation, that has been dedicated to the early detection and prevention of cancer in both our active and retired firefighters.

Since its inception, we have conducted five major cancer screenings, and through these screenings we have identified five retired firefighters and one active firefighter with various forms of cancer. And at the time of these screenings, these individuals were not aware they had this disease.

Our foundation has also been involved in three studies. The first was published in 2007 and was conducted by the Department of Urology at UCSF Medical Center, and it identified bladder cancer rates in the San Francisco Fire Department greater than the population in general and of a major concern for the entire firefighting profession.

Firefighters are exposed every day in the same manner as the general population is to the effects of flame retardants that escape from household products and settle in dust, whether it be in their workplace or in their homes with their families. But once a firefighter enters a burning building, it is a completely different set of circumstances.

Firefighters are fully aware that we work in a chemical cocktail every time we enter a building on fire. Does that hinder the fire extinguishment? The definitive answer there is absolutely not. It is our job to extinguish the fire, preserve life and property, and the job gets done.

The firefighter's biggest fear is what occurs once the fire is extinguished and the overhaul process begins. It is during this period of time where off gassing occurs. Products of combustion have been extinguished, but the emission of toxic gases continues. We are now aware that even if all personal protective equipment remains in place on firefighters, brominated and chlorinated fire retardants have the ability to permeate this equipment. Additionally, if this equipment is not properly decontaminated immediately when returning to quarters, firefighters risk continual exposures every time they don them.

A question that lingers in our profession right now is do these chemicals combine synergistically with other toxins in the atmosphere at a fire and actually exacerbate their carcinogenic properties? What we do know is that our rates of contracting various forms of cancer is increasing. We also are fully aware that these flame retardant chemicals bioaccumulate in our blood, our fat tissue, and in mother's milk.

Chairman Boxer and honorable members of this Committee, I have before me a study that is soon to be released, and I have been given permission to talk about certain aspects of this study. The title of the study is Halogenated Flame Retardants, Furans, Dioxins and Other Persistent Organic Pollutants in the Serum of Firefighters from Northern California.

The firefighters from Northern California that the study refers to is a cohort of 12 firefighters from San Francisco. These firefighters willingly gave their blood after two separate working fires in the city, and the study examined the levels and patterns of halogenated compounds in the serum of the firefighters and compares contaminant concentrations in this cohort with those in the general population and other studies in the United States and worldwide.

The study of our firefighters showed polybrominated diphenyl ethers or PBDEs over 30 percent higher than the general population of California and over 60 percent higher than the general population of the United States. We had one firefighter with a PBDE level 11 times greater than the average of the general population, and the PBDE concentration in the San Francisco firefighters were 20 to 30 times higher than the levels found in the general population of Japan, Hong Kong, and the United Kingdom.

Last Tuesday, I received an e-mail from Dr. Susan Shaw, one of the lead scientists of the study. In this e-mail, she states despite the small sample size, the paper reveals a wealth of information about the exposure of firefighters to a wide range of harmful chemicals during firefighting. It provides evidence that firefighters are exposed to cancer causing dioxins and furans, their congener profiles for brominated dioxins and furans, polybrominated diphenyl ethers, and perflourinated chemicals that are clearly indicative of exposure during firefighting.

Another issue that we have to address in regards to flame retardants in chemicals is the rising cases of breast cancer we are seeing in our female firefighters in San Francisco. We have over 200 female firefighters in our department, the largest of any major metropolitan department in the United States.

Senator BOXER. Excuse me. I am going to have to stop you there, and I will ask you questions about this as I go.

[The prepared statement of Mr. Stefani follows:]

SAN FRANCISCO FIREFIGHTERS
CANCER PREVENTION
FOUNDATION

1139 MISSION STREET, SAN FRANCISCO, CA 94103
TELEPHONE (415) 621-7103 • FAX (415) 621-1578
SFFCPF@YAHOO.COM

Senate testimony of Tony Stefani
Founder/President, San Francisco Firefighters Cancer Prevention Foundation

Hearing on Oversight of EPA Authorities and Actions to
Control Exposures to Toxic Chemicals

Senate Committee on Environment and Public Works

July 24, 2012

Good morning. My name is Tony Stefani I am a retired Captain from the SFFD with 28 years of service. I would like to start by giving a brief history of myself and the San Francisco Firefighters Cancer Prevention Foundation. I spent the last 13 years of my career as an officer at Rescue 1, Station 1 and proud to say one of the busiest firehouses in the United States. After 27 years on the job, I contracted Transitional Cell Carcinoma in my right renal pelvis--a rare form of cancer usually found in people who work in the "chemical industry" according to my doctor. During my treatment and recovery, two more firefighters from my station also contracted Transitional Cell Carcinoma--only the common form, bladder cancer. It also seemed like every month we were attending a funeral of another firefighter that had lost his battle with some form of cancer. In 2006, with the support of the Department's Administration and San Francisco Firefighters Local 798, I formed the San Francisco Firefighters Cancer Prevention Foundation dedicated to the early detection and prevention of cancer in both active and retired firefighters. Since its inception we have conducted five major cancer screenings. Through these screenings we have identified five retired firefighters and one active firefighter with various forms of cancer. At the time of the screenings these individuals were not aware they had cancer.

Our foundation has also been involved in three studies. The first study (published in 2007) was conducted by the Department of Urology at UCSF and identified bladder cancer rates in the SFFD greater than the population in general and of major concern for the entire firefighting profession.

73

Our second study is currently being conducted by N.I.O.S.H at the Centers for Disease Control and Prevention looking at causes of death in a cohort of 30,000 firefighters (5,538 participants from San Francisco Fire, 15,461 from Chicago Fire, 10,652 from Philadelphia Fire) dating back to 1950. The study should be published with results sometime in 2014.

The third study is one that I will address in my testimony.

Firefighters are exposed everyday in the same manner that the population in general is to the effects of flame retardants that escape from household products and settle in dust whether it be in the workplace or at home... But once a firefighter enters a burning building it is a completely different set of circumstances.

Firefighters are fully aware that we work in a "chemical cocktail" every time we enter a building on fire. Does that hinder the fire extinguishment? The definitive answer is, "absolutely not". It is our job to extinguish the fire, preserve life and property and the job gets done. The firefighters' biggest fear is what occurs once the fire is extinguished and the "overhaul" process begins. It is during this period of time where "off gassing" occurs. Products of combustion have been extinguished but the emission of toxic gasses continues. Most departments have Combustion Gases Indicators (CGI's) that are used to measure various toxins in the atmosphere once a fire is extinguished. Once the CGI indicates a "clear" atmosphere, firefighters are allowed to remove their self-contained breathing apparatus (scba's). The problem with this is that the CGI's have the ability to pick up a few toxic gases but nowhere near the 100 plus toxic chemicals that can be encountered in the atmosphere by firefighters on the scene. We are now being told that even if all personal protective equipment remains in place brominated and chlorinated fire retardants have the ability to permeate the protective equipment worn by firefighters. Additionally, if this protective equipment is not properly decontaminated immediately when returning to quarters, firefighters risk continual exposures every time they don the protective equipment.

Flame retardant chemicals (Polybrominated diphenylethers (PBDE'S)) are applied onto or in many common household goods, furniture foam, plastic cabinets, computers, small appliances, consumer electronics, wire insulation, back coatings for draperies and upholstery to name a few. These gases are not picked up by CGI's. These chlorinated and brominated flame retardants produce both toxic dioxins and furans when they burn which have been proven to cause cancer. The significantly elevated rates of cancer reported in firefighters (Kang et al 2008, LeMasters et al 2006, Hansen 1990) include four types that are potentially related

to exposure to dioxins and furans--Multiple Myeloma, Non-Hodgkin's Lymphoma, prostrate and testicular cancer and now our major concern over the rising rates of breast cancer in female firefighters. A question that lingers in our profession is do these chemicals combine synergistically with other toxins in the atmosphere and exacerbate the effect of other toxic carcinogens? What we do know is that our rate of contracting various forms of cancer is increasing. We are also fully aware that these flame retardant chemicals bioaccumulate in our blood, fat tissue and in mother's milk.

Chairman Boxer and honorable members of this committee I hold in my hands the third study our department is involved in. This particular study should be published sometime in September of this year. I have been given permission to discuss various findings of the study. The title of the study is "Halogenated Flame Retardants, Dioxins, Furans, and other Persistent Organic Pollutants in the Serum of Firefighters from Northern California." The Northern California firefighters that this study refers to is a cohort of twelve firefighters from San Francisco. These firefighters willingly gave their blood after 2 separate working fires in San Francisco.The study examined the levels and patterns of halogenated compounds in the serum of the firefighters and compares contaminant concentrations in this cohort with those in the general population and other studies in the United States and worldwide.

The study of our firefighters showed levels of Polybrominated diphenylethers (PBDE'S) over 30% higher than the general population of California and over 60% higher than the general population of the United States. We had one firefighter with a PBDE level of 442ng/g of lipid weight which is 11 times greater than the average of the general population of the United States.The PBDE concentration in the San Francisco Firefighters were 20-30 times higher than levels found in the general population of Japan (Uemura et al 2010), Hong Kong (Qin et al 2011) and the United Kingdom (Thomas et al 2006).

Last Tuesday I received an email from Dr. Susan Shaw one of the lead researchers of this study. In this email she states, "Despite the small sample size, this paper reveals a wealth of information about the exposure of firefighters to a wide range of harmful chemicals during firefighting. It provides evidence that firefighters are exposed to cancer-causing dioxins and furans, and their congener profiles for brominated dioxins and furans (PBDD/F), polybrominated diphenyl ethers (PBDE's) and perfluorinated chemicals (PFC's) that are clearly indicative of exposure during firefighting (versus background exposure)."

Another issue that has to be addressed in regards to flame retardants is the rising cases of breast cancer we are seeing in our female firefighters in San Francisco. We have over 200 female firefighters in San Francisco--the most of any major metropolitan city in the United States. Many of these women are nearing the age of retirement. To our knowledge there have been no major studies in regards to the health of female firefighters. In our 40 to 49 year old group of female firefighters we have 117 women. In that group we have had 8 cases of breast cancer. The national average of breast cancer for the 40-49 year old female group is 1 in 69. It is a known fact that PBDE's bioaccumulate in mother's milk in the general population. It is also known that PBDE's are neurodevelopmental toxicants. The unknown is what level of PBDE's is in the mother's milk of a female firefighter and what effect that is having on their children. Our foundation is in the preliminary stages of a study addressing the health issues of our female firefighters.

On a daily basis the men and women of this profession willingly walk into this toxic soup of chemicals. We are deeply concerned that the federal government does not have the tools or the authority to regulate even the worst of them. Senator Lautenberg's Safe Chemicals Act would allow firefighters to better understand the negative health impacts of the chemicals we are exposed to. It would also give the EPA the tools necessary to regulate those toxic chemicals before they reach the homes and businesses that we are sworn to protect, regardless of the risk to ourselves. We thank Sen. Lautenburg for sponsoring this important legislation and our own Senator Boxer for her leadership in holding this hearing.

In closing I would like say it is probably too late for this generation of firefighters to be protected by a change in the current toxic flame retardant standard, but the generations of firefighters to come will be forever thankful that this very important step was taken. One of the researchers of our flame retardant study made a profound statement by saying, "You are the modern day canaries being sent into the cave". With our rising rates of cancer this is very close to the truth. We urge the Committee to pass the Safe Chemicals Act.

My best,

Tony Stefani
President, San Francisco Firefighters Cancer Prevention Foundation
Retired Captain Rescue 1 SFFD
www.sffcpf.org

SAN FRANCISCO FIREFIGHTERS
CANCER PREVENTION
FOUNDATION
1139 MISSION STREET, SAN FRANCISCO, CA 94103
TELEPHONE (415) 621-7103 • FAX (415) 621-1578
SFFCPF@YAHOO.COM

Questions from Senator Boxer: #1.Mr. Stefani, your testimony highlighted concerns over breast cancer in female firefighters in San Francisco. During the hearing, you testified that your organization is putting together a panel of researchers to look into rates of this cancer in female firefighters and that you would keep the Committee informed as the study progresses. Can you provide an update to the Committee on the progress on this study?

To address mounting concerns about chemical exposures in this important profession, the San Francisco Firefighters Cancer Prevention Foundation has begun work on developing a community-based, participatory biomonitoring study that entails a collaboration, entitled the *Women Firefighter Biomonitoring Collaborative (WFBC),* between two environmental health scientists (Rachel Morello-Frosch, University of California, Berkeley School of Public Health and Ruthann Rudel, Silent Spring Institute based in Massachusetts); two firefighter advocacy groups (Heather Buren, United Fire Service Women (UFSW) and Tony Stefani, San Francisco Firefighters Cancer Prevention Foundation (SFFCPF)); and two environmental health advocacy organizations (Sharyle Patton, Commonweal Biomonitoring Resource Center and Connie Engel, The Breast Cancer Fund).

The proposed Women Firefighters Biomonitoring Collaborative Study (WFBC) will:

1. *Prioritize a subset of chemicals identified as causing mammary tumors in animals, and compare these chemical exposures between San Francisco women firefighters ("exposed group") and age and sex matched controls among school teachers and a subset of age matched co-habitants (female or male) from each group.* Specifically, we will focus our biomonitoring efforts on those mammary carcinogens identified by a systemic review conducted by Silent Spring Institute, which includes products of combustion, flame retardants, and other compounds that are likely to be encountered by firefighters.

2. *Identify newer chemicals through novel applications of Time of Flight (TOF) LC/MS technology or high-performance metabolic profiling (HPMP) methods.* Both of these analytic methods can provide a non-targeted, and thus more

systematic, agnostic, and comprehensive approach to assessing chemical exposures in our study population. This aspect of our study will provide unprecedented data to characterize exposures to environmental contaminants to a uniquely vulnerable population of women. We anticipate that this research will identify a number of chemicals (including substitutes for currently banned substances) that have not been previously measured in the human population.

3. *Report back individual–level and aggregate results to study participants who want them.* We will develop a results communication strategy to provide individual biomonitoring results to those study participants who request them. Members of the study team have extensive experience in the development and evaluation of personal exposure assessment report-back methods, and we will tailor our approach to reporting individual and pooled study results for this specific study population.

4. Finally, the collaborative is discussing the possibility of having the Commonweal Cancer Help Program do a one-day training for firefighters with cancer who would like information about maintaining health and well-being during treatment, and getting informed about cancer therapies and the decisions that need to be made in designing a course of treatment, as well as an environmental health training, which will acquaint firefighters with the complexities of breast cancer's links to environmental threats.

#2.Can you please describe the different types of exposures to dangerous chemicals that firefighters could encounter on an average day?

Firefighters during the course of a working day are exposed to harmful chemicals not only at the scene of a working fire but also at the firehouse. At the fire scene, firefighters are potentially exposed to various mixtures of particulates, gases, mists, as well as fumes of an organic and/or inorganic nature. Many of these chemicals are known carcinogens. These include benzene, polycyclic aromatic hydrocarbons, benzo(a)pyrene, formaldehyde, chlorophenols, dioxins, ethylene oxide, flame retardants, polychlorinated biphenyls, vinyl chloride, methylene chloride, trichloroethylene, arsenic, asbestos, perchlorethylene, toluene, xylene, to name a few. (There have been over 130 chemicals documented at working fires.)

SAN FRANCISCO FIREFIGHTERS
CANCER PREVENTION
FOUNDATION
1139 MISSION STREET, SAN FRANCISCO, CA 94103
TELEPHONE (415) 621-7103 • FAX (415) 621-1578
SFFCPF@YAHOO.COM

At the firehouse where firefighters spend long hours, exposures may occur to complex mixtures that comprise diesel exhaust (benzene), particularly if trucks are in closed stations without adequate outside venting.

Firefighter exposure to chemicals occurs in several ways. The most easily perceived way is through direct contact with a chemical liquid that has the ability to permeate the protective clothing worn by the firefighter. Chemical contamination of a firefighter's clothing is now an ongoing problem in our profession. The persistency of chemicals that do not easily evaporate will tend to stay in the material. Soot on a firefighter's clothing can act like sponges to the chemicals in the air. The retention of chemicals in the clothing can provide a long lasting, chronic-like exposure of firefighters to hazardous chemicals.

A second and more common fireground exposure is by contact with fire smoke or other vapors at the fire scene. In this situation the firefighter's entire body is exposed and because turnout clothing is not vapor-protective, the fire gases and vapors will penetrate interfaces and other portions of the turnout gear where it can come in contact with their skin.

Many firefighters believe that the wearing of their self-contained breathing apparatus (SCBA) during emergencies will prevent their exposure to hazardous chemicals, other than by direct liquid contact. SCBA's are effective and have provided outstanding protection to firefighters in the past several decades. However, inhalation is but one route of exposure. Skin absorption is also a significant route of exposure to many chemicals. As I mentioned in my testimony in July, firefighters are now aware that even if all personal protective equipment remains in place brominated and chlorinated fire retardant chemicals have the ability to permeate the protective equipment worn my firefighters.

A study conducted by N.I.O.S.H. concluded that different areas of a firefighter's protective ensemble are likely to demonstrate varying propensities for the absorption of chemicals. Any porous fabric material found in the clothing or other items may be contaminated. These include: turnout clothing outer shell, moisture barriers, thermal liners, collars and wristlets, station/work uniforms, glove shells and liners, protective hoods, helmet straps and self-contained breathing apparatus straps. Coated materials such as moisture liners, reflective trim, rubber boot outers, respirator masks are more likely to be affected by permeation. The same is true for hard plastics or resins such as those used in the helmet, SCBA components and certain turnout hardware.

SAN FRANCISCO FIREFIGHTERS
CANCER PREVENTION
FOUNDATION
1139 MISSION STREET, SAN FRANCISCO, CA 94103
TELEPHONE (415) 621-7103 • FAX (415) 621-1578
SFFCPF@YAHOO.COM

A book can be written on the different types of exposures to dangerous chemicals that firefighters can encounter on an average day. This was a brief overview.

#3.Mr. Stefani, firefighters put their lives on the line every day to help save people in need. I do not believe that they should also have to risk their long-term health by being exposed to dangerous chemicals, especially when there are safer alternatives to those chemicals. Can you describe how important it is that TSCA is reformed to help ensure that chemicals are safe and that less toxic alternatives are developed for chemicals that could threaten public health?

Nationwide the rates of cancer among both active and retired firefighters are on the rise. We are seeing this trend first hand in San Francisco. In the last month we have had 2 of our active female firefighters undergo double mastectomies. This is in a population of approximately 117 female firefighters in the 40 to 50 year old age group (National average is 1 in 69). It brings a total of 11 women in this age group that have contracted this disease. One of them has lost her battle to the disease. We have approximately 213 women firefighters in our department. Also in the last month we lost a 62 year old male firefighter to brain cancer and have had a 59 year old firefighter diagnosed with brain cancer along with a 44 year old firefighter diagnosed with prostate cancer. None of them have a family history of the disease. These are but a few examples.

The Toxic Substances Control Act (TSCA) of 1976 that is currently in place to assess chemical safety is a complete failure. It has failed to protect our profession, our families and the environment. Its failure has resulted in Americans being exposed to numerous potentially toxic chemicals from everyday consumer products. As harmful as that is to the public, when those products ignite the exposure of the men and women of our profession walking into fires to save lives is greatly increased. As I stated in my testimony, firefighters are fully aware that we work in a toxic chemical cocktail every time we enter a burning building. Our profession does all it can to limit the toxic chemical exposures that firefighters endure during and after a "working fire". We realize that many of the chemicals we come in contact with have the ability to permeate our protective equipment. One of our biggest fears is that these particular chemicals are known

SAN FRANCISCO FIREFIGHTERS
CANCER PREVENTION
FOUNDATION
1139 MISSION STREET, SAN FRANCISCO, CA 94103
TELEPHONE (415) 621-7103 • FAX (415) 621-1578
SFFCPF@SFAHOO.COM

to be persistent, bioaccumulative and toxic, greatly increasing our chances of contracting some form of cancer.

Cancer rates among firefighters provide a loud and clear call for the need to address toxic chemicals in our society. Firefighters can no longer act as the "modern canaries in the mine!" The impact of toxic chemicals on firefighters should prompt Congress to act now to reform TSCA.

Comprehensive reform is needed to ensure that the alternatives replacing toxic chemicals are in fact safer. It is time for the chemical industry to develop and provide information on the health and environmental safety of their chemicals. It is time for chemicals to be proven safe before being put to use. It is time for passage of the Safe Chemicals Act.

Tony Stefani
President, San Francisco Firefighters Cancer Prevention Foundation

Senator BOXER. What we are going to do, first of all, thank you all. We are going to start with Senator Carper. We are going to each have 10 minutes to question so we can really get to some of the issues here.

Senator Carper.

Senator CARPER. Thank you. I will not use all of this. Thank you very much for allowing me, and thank you all for joining us today.

First question is pretty simple, and I only ask that you keep your responses brief. But if you could, each of you, just share with us, maybe the single most important lesson that you all have learned or gained from your experiences in really focusing on this U.S. chemicals issue that you think we can learn from or benefit from. Just one. Single best.

Would you like to go first?

Mr. STEFANI. Is that question posed——

Senator CARPER. For the whole panel.

Mr. STEFANI. I think what we have learned——

Senator CARPER. Just be brief.

Mr. STEFANI. What we understand right now is that these are important chemicals that have to be dealt with because of this bio-accumulative process that is actually proven in medical science right now.

Senator CARPER. OK. Thanks. Did you want to say something else?

Mr. STEFANI. No.

Senator CARPER. OK, fine.

Mr. Rawson.

Mr. RAWSON. I think we should think of TSCA as providing a framework for making good decisions. But I do not think we should count the number of test rules promulgated or the number of Section 6 rules promulgated when deciding how effective it is. I think what we should look at is how can we best get EPA the information it needs, how can industry and EPA and other stakeholders work together to meet the objectives of TSCA.

Senator CARPER. All right. Thank you.

Mr. Moore.

Mr. MOORE. In the context of the discussion on flame retardants, I think what I would most like to say is that, I guess, as a scientist, also as a father, I think in terms of looking at the risk of fires versus other risks in society. We cannot forget the risk of fires and the statistics showing that it is a clear and present risk and we have to take that into consideration in the entire discussion about the review of the risks and hazards associated with flame retardants, fires, and the use of those chemicals.

Senator CARPER. All right. Thank you.

Ms. Stapleton. Dr. Stapleton.

Ms. STAPLETON. Just in regards to flame retardants and based on the research data I have collected and then what I have read in the peer reviewed literature it seems apparent to me that the potential health effects and other disadvantages of using these chemicals potentially outweigh any purported benefits that some industry members claim that they have in terms of their applications in some consumer products.

Senator CARPER. OK. Thank you.

Ms. Pingree.

Ms. PINGREE. Thank you. Good question. I think as a former State legislator I would say our experiences in Maine, as highlighted by the Chicago Tribune and other States, what we learned is that the chemical industry does not always tell the truth. And they will do a variety of means to beat back regulation of chemicals, especially considering they are making considerable profits selling these chemicals.

And in Maine, we had an industry front group. We had many of the companies represented at this table, the American Chemistry Council, spending huge amounts of money misleading legislators and doing whatever they could to deny that, for example, the chemical Deca had both health impacts and was building up in people.

So I have great respect for all the folks up here, but I really would say as a parent I do not trust these companies to tell the truth about their chemicals, and I do not think the American public or you, as Senators, should either.

I think that is my No. 1 learning, and I hope that that has been made clear through my testimony today.

Senator CARPER. OK. Thanks so much.

Madam Chairman, I am going to ask unanimous consent to enter a statement for the record, and I have a couple of questions I would like to submit for the record. I am supposed to be in three places at once, so I am going to slip out.

Senator BOXER. Oh, my goodness.

Senator CARPER. I appreciate you all being here and for this conversation today and the work that Senator Lautenberg and certainly Senator Inhofe and others have done on this issue.

Thank you.

Senator BOXER. Thank you. Senator Carper, thank you for coming by, because I think the question you asked was very important, I thought.

I have a lot of questions, so if I run out of time I am going to take a second round. So, I am going to get to all of you.

I will start with Ms. Pingree. Your testimony contains a letter from the Professional Firefighters of Maine to the American Chemistry Council that expresses shock and concern about an array of disturbing actions by member companies of the American Chemistry Council including the creation of a phony fire safety group, a phony fire safety group that lobbied on behalf of the industry.

The letter asks the American Chemistry Council to expel three companies, Albemarle, Chemtura, and ICL, for their unethical behavior. Do you know if the ACC has responded to this letter or if they have committed to expel these members?

Ms. PINGREE. I will say there is another letter in my testimony also from a group of State legislators and legislative leaders from around the country of which I signed that made a similar request following the Chicago Tribune story. And we received a response to our legislator letter. I do not know if there was a response made to the firefighter letter.

The response we got from Cal Dooley, the head of the American Chemistry Council, was that they were going to let the member companies respond on their own. They thought that there were some misleading facts out there in the Chicago Tribune story; they

were not prepared to take this action despite their own ethics and responsibility code that they said that they abide by.

In fact, the American Chemistry Council in that same letter said we are not involved in these State legislative battles so we will leave it to these folks to respond on their own——

Senator BOXER. So, they took no responsibility.

Ms. PINGREE. They took no responsibility, yes.

Senator BOXER. For this phony group that said they posed as a fire safety group.

Ms. PINGREE. Yes.

Senator BOXER. And it included Mr. Moore, so I am going to ask Mr. Moore, following up, who was on this fire safety group that actually was an honest broker?

Mr. MOORE. In terms of Citizens for Fire Safety, Citizens for Fire Safety is an organization in which we were a founding member and have been a member of. Like many organizations, trade organizations, professionals were hired to organize it and run the organization.

Senator BOXER. So, wait a minute. The chemical companies were a member of the fire safety group. This was your credential. You are a chemical company, but you are suddenly considered some kind of advocate for fire safety and expert on that? Is that what you did by joining?

Mr. MOORE. Yes, Senator Boxer, we are members of that organization. As a provider of flame retardants we do have——

Senator BOXER. You do not see a conflict of interest? Let us just talk between us and make believe no one is listening. You make these products and yet you do not see an ethical problem with being on a group that says you are for fire safety? You do not see an ethical problem, a conflict of interest in that?

Mr. MOORE. Respectfully, Senator, I do not see a conflict of interest in that.

Senator BOXER. Well, you ought to take a little lesson in ethics if you do not see it.

Now, your testimony states that your company has acted proactively to fully comply with EPA's chemical management regulations. You talked about that today. We fully complied. But last month your company was assessed a $56,000 penalty for failing to comply with the reporting requirements of TSCA and EPA regulations for manufacturing two brominated flame retardant chemicals in 2005. Why did your testimony fail to mention this? Why would you say you fully complied when you did not?

Mr. MOORE. Senator, my understanding of the that particular case if that there were clerical errors at the time of the——

Senator BOXER. That there were what? I am sorry.

Mr. MOORE. There were errors in the reporting at the time of that reporting which occurred several years ago. The penalty that was assessed was a reduced assessment because of our proactive cooperation to correct those errors.

Senator BOXER. But you were assessed a $56,000 fine, were you not?

Mr. MOORE. That is my understanding, yes, Senator.

Senator BOXER. Well, I think if you are going to say that you complied you should have mentioned that. Just in fairness.

Mr. Moore, your testimony cites a 1988 study conducted by the U.S. Department of Commerce to support your claim that adding flame retardant chemicals to household items are effective fire protection. Now, the Chicago Tribune cited the study's lead author who said that the chemical industry has grossly distorted the findings of the study. That—the study's lead author said the chemical industry distorted the findings of the study and that flame retardants in home furnishings offer little or no fire protection.

Do you not think it is time that the chemical industry stopped grossly distorting the study's findings? When the author says that is what you are doing? Do you not owe people an apology?

Mr. MOORE. With all due respect, Senator, we have not distorted the findings of that study. You will find——

Senator BOXER. Whoa, whoa, whoa. The author said you did. Who is a better source? The study's lead author said the chemical industry has quote unquote grossly distorted the findings of the study and that flame retardants in home furnishings offer little or no fire protection. Why are you not apologizing for grossly distorting the study? I do not get it.

Mr. MOORE. Senator, if you would refer to my written testimony, the exact conclusions from that study are presented in those findings. There were several other authors at NBS, which is now NIST, that participated in that study. I have personally spoken to some of those scientists who have assured me that the conclusions of those studies are as valid today as when they were published and that study is still available through NIST.

Senator BOXER. Well, if I wrote a study, and people took it out of context and distorted it, I think the right thing to do is to say I am not going to use it any more. But that—it is an ethical question. You have to live with yourself over it.

Dr. Stapleton, when flame retardants persist in the environment, can they slowly break down into other chemicals? And during and after fires, can they more quickly break down into other chemicals? And can these other chemicals be more toxic than flame retardants?

Ms. STAPLETON. Yes. When speaking about PBDE flame retardants, there is evidence suggesting that the Deca-BDE can break down in the environment to Penta- and Octa-BDE which are known to be more bioaccumulative and potentially toxic.

In addition, when these chemicals are present in consumer products and they do burn, they can form what are known as brominated dioxins and furans, which are much more toxic than the parent compounds and are linked to cancer.

In addition, I would just like to comment that peer reviewed studies have also demonstrated that the presence of these chemicals in consumer products leads to the generation of more soot, smoke, and carbon monoxide when they do burn which one could argue actually increases fire hazards.

Senator BOXER. And Doctor, I would assume you believe that the substitutes for these chemicals, as they come out, you would believe they should be tested thoroughly.

Ms. STAPLETON. I do think we need more data on them, and that is something my colleagues and I are trying to provide, more data on the potential health effects from these chemicals in relation to

the current exposure levels that are occurring in the general population, particularly for children.

Senator BOXER. And of course, that is the essence of Senator Lautenberg's bill, which is to make sure that these are safe before they are routinely used.

And we have people like our heroes, our first responder heroes like Mr. Stefani here who beat back cancer. And he describes—and I am going to ask you—one of the main concerns that firefighters have following a fire is during the overhaul process when the fire is extinguished by burned material at the site, and you have this off gas. Can you explain what you mean by off gas?

Mr. STEFANI. Sure. The products of combustion that have been extinguished, if you can actually visualize this, you are in a room and you would have still some smoke weeping. But there are also toxic gases that you cannot see. We have what is called Combustion Gas Indicators and these indicators are capable of picking up various toxic gases, usually about four of them. The problem herein lies that they do not pick up the 100 plus other chemicals that we are confronted with.

And once these CGI monitors deem the atmosphere to be cleared, the incident commander can have firefighters remove some of their self-contained breathing apparatus and continue the overhaul process and actually increase the level of exposure. But the problem is that even if this self-contained breathing apparatus is taken off, we are now told that these chemicals do have the ability to permeate parts of this equipment, even though they are in place.

Senator BOXER. Well, Mr. Stefani, firefighters put their lives on the line every day, and I do not believe that you should have to risk the long-term health effects of being exposed to these dangerous chemicals and because there are certain people in this society who seem to put their business interests ahead of safety.

You started to talk about female firefighters, and I would like to ask you about that. Could I put that whole study into the record? Is that all right?

Mr. STEFANI. Absolutely.

Senator BOXER. All right. We will do that. But is there—I understand that in San Francisco these breast cancers have come forward in female firefighters. Are there researchers looking into this rate and doing some studies on it?

Mr. STEFANI. We have just put a panel together, and we are going to address that issue. One of the things that we have come to find is the women in the fire service have not been in for a large—long period of time, maybe 30 to 40 years right now. And there have been no studies that we know nationwide of female firefighters. We are in the initial stages right now of putting that exact study together.

Senator BOXER. That would be very helpful. Would you keep this Committee informed as you go forward?

Mr. STEFANI. Yes, Senator.

Senator BOXER. Thank you.

Senator Lautenberg.

Senator LAUTENBERG. Dr. Stapleton, studies have found that children born in this country have higher levels of toxic chemicals than those in other countries. What is it that puts newborns at risk

at the level that we have with flame retardants in their bodies? How does that take place?

Ms. STAPLETON. Animal exposure studies have demonstrated that when you expose young animals, developing organisms, that these are very critical, sensitive time points when their brain is developing that the effects can manifest into adulthood and be more pronounced that if you expose them, let us say, during adolescence or adulthood.

So, the concern is that the ability of these chemicals to influence the way that our neurons develop, the way that they differentiate, the communication between brain cells which can lead to problems with neural development which are reflective of studies that I have seen of the effects on children such as reductions in IQ and problems in gross and fine motor skills in the U.S. population.

Senator LAUTENBERG. So, have these exposures taken place in the development of the fetus that the mother passes on?

Ms. STAPLETON. Yes. Studies have demonstrated that when a pregnant woman or a pregnant animal is exposed to these, they are transferred to the developing fetus through placental transfer and through lactation. So, when a mother breast feeds her child, they are exposed to those chemicals as well.

Senator LAUTENBERG. Ms. Pingree, you make a point in your testimony that the States are running around trying to ban these fire retardants and flame retardants. Would you not think that if EPA had the authority to address these chemicals under TSCA that the States could be relieved of a burden knowing that they are doing the right thing and leveling the playing field, no matter what State you are operating in?

Ms. PINGREE. That is a good question. Certainly, State legislators have started to act on this issue and have acted for the last 10 years because of the failure of the Federal law. I think our interests at the States is to respond directly to our citizens who we represent, and if there is a public health interest, the State legislator will work toward protecting that public health.

Certainly, if the EPA had had authority starting in 1976 to really regulate these chemicals and protect public health, and we did not see a chemical like Deca on the market that we knew was bad for people's health, or PBA or one of the hundreds of chemicals that we know are of concern, the States would not have to take action. But that being said, the States will continue to take action until we are confident that public health is protected.

In the case of Deca, which I talked about, it was—a phase-out was agreed to in 2009. In 2010 I actually proposed a bill because they had agreed to stop using it in certain products, but there was a new use. They started using it in huge quantities in plastic pallets, pallets that were used to transport food, all kinds of consumer items, and we knew that these pallets were already leaching Deca onto the packages, into the environment. So, the challenge is, we know, that even when we took action in Maine, it led to the industry trying to figure out another use for that chemical in another place.

So, the States will certainly, I am sure—slow action if the Federal Government is able to act to a degree that we know protects public health. But until then, I think the States will keep acting.

Senator LAUTENBERG. Mr. Rawson, I noticed that in the letterhead on your testimony, that you describe yourself as Partner and Chair of the Environment, Land and Resources Department in Washington, DC. It then lists Latham & Watkins. Is that a position of great responsibility, Partner and Chairman of a department within the law firm?

Mr. RAWSON. I am a partner in the firm. Thank you. I am a partner in the firm. We have a very large environmental practice. We have a Global Department Chair who is based in Los Angeles, and I am the local Department Chair. I am the Chair of the practice in Washington, DC.

Senator LAUTENBERG. I must say that there is a subtle implication here that this is some part of either Government or otherwise, but do it as you may, I do not think it lends particular credibility. But that is up to you.

And we hear the appeals that go on to say that everybody is dealing in good faith and that the Albemarle Corporation, our Chairman noted, had some problems. How do you explain that these problems occurred? I was not sure I got the answer before.

Mr. RAWSON. With apologies, I do not understand your question.

Senator LAUTENBERG. OK. Was there a fine imposed on Albemarle Corporation for a reason?

Mr. RAWSON. This might be a question that should be directed to the person to my right if you are referring to the fine that Senator Boxer was——

Senator LAUTENBERG. I am sorry. Yes, you are right.

Mr. Moore, you did deal with it, and you described it as clerical error that caused this problem.

Mr. MOORE. Yes, Senator. I was not personally involved in the resolution of this, but I do understand that there was an error—again this goes back to 2002, 2006—just a simple error in the reporting. But our representatives that worked with the EPA worked proactively to resolve this and in recognition of our proactivity in resolving this, got a—the penalty was reduced.

Senator LAUTENBERG. Mr. Stefani, your testimony is really important. I was amazed at the number of firefighters that are represented by the organization that you are talking about, 290,000. Is that the number of firefighters that the organization represents?

Mr. STEFANI. No. The San Francisco Firefighters Cancer Prevention Foundation, our foundation, is based in San Francisco, and it is both retired and active firefighters that we deal with.

Senator LAUTENBERG. Some years ago, we had an incident in Elizabeth, New Jersey, when firefighters went into a building aflame, and what happened is the exposure to the chemicals that were stored in this facility and the uniforms that the fireman were wearing actually began to melt.

Thus, I wrote a law that was called the Right to Know Law, and the consequence was that there was a substantial—and that was in 1986—there was a substantial reduction in the amount of toxic emissions that were coming from these companies. And I am not surprised when you talk about your experience and how heavy a burden it was on you and what the ultimate outcome was for having to go into these situations and face these chemical presence as it is.

So, I thank all of you for being here and testifying. But I must say that the unwillingness of our two friends in the middle of the table to acknowledge that there can be value in getting testing to protect the people who are subjected to these influences in the environment. And I would think that the companies that you talk about or talk up would want to be part of an effort to reduce the risk to the people in our country from the fire retardants for which substitutes are apparently available.

Thank you.

Senator BOXER. Thank you, Senator.

Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Chairman, and thank you for holding this hearing and Senator Lautenberg for his long standing leadership in this area. This obviously hits home in Rhode Island because researchers at the University of Rhode Island have found these PBDEs throughout Narragansett Bay with concentrations highest near Providence where most of our population lives.

And from Dr. Stapleton's findings, it seems to be consistent with the national findings. She says that the Centers for Disease Control and Prevention have said that 99 percent of the U.S. population has flame retardants in their bodies. U.S. adults have body burdens that an order of magnitude higher than European and Asian countries and that studies have shown that children clearly have much higher exposure and body burdens of flame retardants compared to adults.

Could you tell me, Dr. Stapleton, kind of go—take it back a step, why does a chemical bioaccumulate? Have we not developed processes as organisms for processing chemicals through our bodies?

Ms. STAPLETON. Well, certainly we have enzymes or proteins in our body that are capable of metabolizing certain compounds. However, substantial data exists to show that there are certain chemical features that are resistant to metabolism. And in the case of PBDEs, those structures are clearly represented. They are very non-polar, they are halogenated, they are quite large, they have what we call a high hydrophobicity factor, a low KOW, which leads to this bioaccumulation potential and resistance to metabolism in the body.

Therefore, some of these PBDEs are estimated to have what we call a half-life, or the time it takes for the concentrations of these compounds to decrease in the body by 50 percent, of up to 7 years. So, it takes a long time before the levels will drop.

Senator WHITEHOUSE. And from a layman's point of view or from a more general point of view, are new and manmade chemicals more likely to be difficult for the human body to process than ones that have been—ones that we have adapted to over years, generations of exposure?

Ms. STAPLETON. Well, this is a little outside my area of expertise as I am a chemist and not a toxicologist or a physiologist. But I can say that typically our bodies are not used to processing these chemicals for sure, and they can lead to more increased exposure or accumulation in our tissues.

However, some of the chemicals in PBDEs are a classic example of this heavy structure that is actually very similar to hormones in our body, which is what results in what we believe are—is respon-

sible for their potential toxicity. PBDEs have a structure, a chemical structure, that is very similar to thyroid hormones, for example, which is one of the reasons they are known to effect thyroid hormone regulation.

Senator WHITEHOUSE. Now, when you were looking into your research, you have indicated that claims about confidential business information inhibited your ability to do the research that you are trying to do. Could you elaborate a little bit on what limitations you experienced?

Ms. STAPLETON. Certainly. Well, with the growing evidence that the PBD concentrations were increasing in human tissues, many academic researchers were interested in conducting exposure studies or trying to identify the primary routes by which people are exposed and identify what the most common sources were in our homes or to which we come in contact with on a daily basis.

And unfortunately, these products, as I said, they are not labeled. When speaking with the Polyurethane Foam Manufacturers Association, for example, several of them have told me that sometimes they do not even know what chemicals they are putting into their products that they manufacture in terms of furniture.

The only way we were able to determine what chemicals are actually used, are found in products on the market today, was by taking samples of those products and spending a lot of money and using very expensive equipment to analyze them in my laboratory. We found many of them to have proprietary chemicals, but with the technology today, we can determine what those structures are. Now we are beginning to assess exposure to those new chemicals and trying to determine what the potential health hazards may be.

Senator WHITEHOUSE. So one could hypothesize that if one were concerned about a competitive business motive for protecting this information, it would be within the realm of most major corporations to be able to afford the kind of testing that you did. So, they would really have no problem being able to figure it out. It is independent testers who do not have access to that kind money that are most disabled by the confidential business information claims.

Ms. STAPLETON. That is correct. In this day and age it is not that difficult to determine what the chemical structures are in all of these different products.

Senator WHITEHOUSE. So, if a big company wanted to do what you did they could do it pretty readily?

Ms. STAPLETON. Yes.

Senator WHITEHOUSE. But a researcher, it is a real handicap for.

Ms. STAPLETON. Well, this is why we are doing this, determining what their structures are so that we can determine what the levels are in our indoor environments and what the levels or the exposure levels are for children and then run some toxicity studies with them.

Senator WHITEHOUSE. Mr. Moore, what dangers at what levels of exposure exist with respect to the flame retardants that Chemtura manufactures?

Mr. MOORE. First, we manufacture a wide variety of flame retardants. With respect to the ones we are discussing today, Firemaster 550 and TBB within that, we have conducted over 30 studies for regulatory agencies as part of the pre-manufacturing

notification review of TBB. Those studies were reviewed, submitted to EPA, 15 of those studies were required by EPA. The assessment of those found that the relative risk of those are extremely low and were acceptable for safe use in their application.

I would like to comment on your other question, if I may.

Senator WHITEHOUSE. Well, let me try to get an answer to my first question. Does Chemtura concede any danger from its—from these two flame retardants that you have identified?

Mr. MOORE. Again, in terms of the expected exposures, in 2006 EPFC published expected exposures or predicted exposures of TBB and those are much lower than any level that was predicted to have any sort of an effect. So, in those terms, the answer to your question would be that no, those are——

Senator WHITEHOUSE. They are perfectly safe. OK.

Ms. Pingree, I wanted to go to a section of your testimony, and I would like to highlight it. Maine does not have disclosure laws, you said, that would allow us to understand the full magnitude of the spending against your bill to regulate these flame retardants.

We know that the chemical industry hired many of the State's top paid lobbyists and public relations groups. They proceeded to pay for several weeks of high saturation television and newspaper advertising across the State urging defeat of a chemical ban. They ran 27 full-page ads in the State's largest newspaper, and in addition to weeks of television ads, they purchased radio spots, direct mail to voters, and paid robo-calls. Was this all done through the front group?

Ms. PINGREE. Yes.

Senator WHITEHOUSE. Or was some of it done in the name of the chemical companies?

Ms. PINGREE. In Maine, it was all done through a front group called Keep America Safe which has been replaced by Citizens for Fire Safety.

Senator WHITEHOUSE. The chemical industry front group which did all of this, right, at the time was called Keep America Fire-Safe, since renamed Citizens for Fire Safety. As you said, despite their name, during their time before the Maine legislature, the chemical industry and its allies had no support from State fire safety groups or fire professionals.

Keep America Fire-Safe even paid for an ad that claimed Maine legislators were seeking to weaken fire safety accompanied by video of a burning house. You could imagine what that would look like. The ad urged the public to call their legislators and tell them to vote against these proposed changes for the sake of fire safety.

You also noted that flame retardants bans, your legislation, were strongly supported by Maine's fire professionals including the State Fire Chiefs Association and the major State firefighters union, the International Association of Firefighters. Both groups, you say, worked aggressively for the bill's passage, and the firefighters spoke passionately about the negative impacts of these chemicals on firefighter health.

I gather there was one group that went with the chemical industry. It was called the National Association—not Maine Association—the National Association of State Fire Marshals which received pro bono work from the public relations firm that was rep-

resenting the chemical companies and received significant financial support from those chemical companies, and then turned around and lobbied for more stringent State flammability standards which would require more flame retardant chemicals. That would appear to be a conflict of interest.

Ms. PINGREE. And I will say, speaking directly to the National Fire Marshals Association, at the time we were working on our bill in Maine, John Dean, our State Fire Marshal in Maine, was the head of the National Fire Marshals Association and was prepared to testify against our bill. He works for the Governor, and he was somewhat outed for their relationship in Washington with the flame retardant industry. And he either ended up testifying neither for nor against or actually supporting the legislation.

But we had uncovered this relationship which was obviously a huge conflict for the State fire marshals who at the time were receiving significant funding from the chemical companies who produced flame retardants. So, that was a relationship that obviously was not working for the benefit of public health or fire safety.

Senator WHITEHOUSE. It just strikes me, Madam Chair, that this is what Rhode Islanders hate about politics and about the manipulation of politics. It really has got all of the ingredients. You have got a lack of disclosure. We just went through this big exercise on the Disclose Act in Washington to try to put a little bit of sunlight into who is spending $1 million, $2 million, $4 million to achieve special interest influence around here, and we were defeated, unfortunately.

You have got a sort of high intensity bombardment of the public by the special interests. You have got dishonesty in the way it is done with what looks to me like a phony group that is set up just for the purpose of pretending to represent fire safety interests when it truly actually supports chemical company interest. You have got all sorts of lobbyists and maneuvers involved. You have got legitimate associations that have lent themselves to conflict of interest and are now, unfortunately, perhaps working more consistent with the conflict of interest than with the true interests of the fire marshals around the country. And the result was that—what happened?

Ms. PINGREE. Well, I mean, you point out that like the people in Rhode Island, the people of Maine did not buy it. They did not call us. They did not tell us to vote against this bill. And the bill ended passing nearly unanimously in the House and Senate. Republicans, Democrats, all supported it because they did not want to be on the wrong side of protecting kids, protecting pregnant women, protecting people's health.

I think we made a strong case, and despite a lot, a lot of money, we still won. And so, certainly, that is what we are hoping to see in your Committee. Thanks.

Senator WHITEHOUSE. So, congratulations. Sometimes the good guys can win despite all of the machinations of special interests.

Thank you, Madam Chair.

Senator BOXER. Thank you so much.

If I could just talk about California for a minute. We know that UC San Francisco studied the blood samples from pregnant women in California. We, in our State, generally had higher levels of

PBDEs than other women in the United States as well as Europe and Asia and that the women also had lower levels of hormones produced by the thyroid.

Now, one theory is that California was an early State that said we needed flame retardants. So, they are now working on the details of that study. But it very disturbing.

And I want to thank you, Tony, very much for the work you are doing. I mean, I am so grateful to you. And all of you for coming here today.

So, I have a question I want each of you to answer yes or no. There is no other answer. Just yes or no. And I am going to start with Hannah.

Do you agree that chemical manufacturers should have to prove through unbiased studies that their products are safe for pregnant women, for infants, and for children before they can sell those chemicals in the U.S.?

Ms. PINGREE. Yes.

Ms. STAPLETON. Yes.

Mr. MOORE. Yes, I agree.

Mr. RAWSON. Could you repeat the question?

[Laughter.]

Senator BOXER. Do you agree that chemical manufacturers should have to prove through unbiased studies that their products are safe for pregnant women, for infants, and for children before they can sell those chemicals in the U.S.?

Mr. RAWSON. Respectfully——

Senator BOXER. No, not respectfully. Yes or no.

Mr. RAWSON. The question cannot be answered without explanation.

Senator BOXER. Mr. Stefani.

Mr. STEFANI. Yes.

Senator BOXER. Thank you. Majority wins. Let me just say the reason we are having the markup is just to answer that question. If someone cannot answer that question with an affirmative response, then they are putting the special interests before the health of the people, before the health of their own kids, before the health of the first responders.

You can say, with due respect I am a lawyer, and I see every side of it. Well, I am married to a lawyer, my son is a lawyer, my dad was a lawyer. I know that it is a little harder for lawyers to answer yes or no.

But this one? Do you agree that chemical manufacturers should have to prove through unbiased studies that their products are safe for pregnant women, for infants, and for children before they can sell those chemicals in the U.S.? And the reason we are having the markup of Senator Lautenberg's bill is because that is what we are going to do here.

Now, we are going to have a hard time because the chemical industry and their spokespeople are very strong. We are going to have a hard time because there is a lot of money on the line, and you know about follow the money. But at the end of the day, the people are going to be on the side of making sure products are safe for pregnant women, for children, for infants, for firefighters whom they revere. And I am going to do everything I can.

I want to say thank you to all of you. I know our minority witnesses lost a little bit of back up for some reason, but I do not know why, but that is what happened here. So, that is the situation.

I thank you all. If you have anything further we will keep the record open for 24 hours if you want to expand on anything you said here today. Thank you very much.

We stand adjourned.

[Whereupon, at 12:10 p.m., the Committee and Subcommittee were adjourned.]

[An additional statement submitted for the record follows:]

STATEMENT OF HON. JEFF SESSIONS,
U.S. SENATOR FROM THE STATE OF ALABAMA

Good morning. Thank you, Chairman Boxer and Subcommittee Chairman Lautenberg, and Ranking Member Inhofe and Subcommittee Ranking Member Crapo, for calling this hearing on chemical safety and flame retardants. The impact of chemicals on human health is an important issue and worthy of serious consideration. Exposures to chemicals in the home environment tend to pose greater risks to children than other members of the general public. Likewise, children are often more vulnerable to serious injury or death than adults when home furnishings catch fire.

Last week, Senator Durbin held a Senate Appropriations subcommittee hearing on this same topic. My colleague Senator Lautenberg is a member of that subcommittee as well and spoke eloquently at that hearing on the topic of chemical safety and flame retardants. Senator Lautenberg, I know this is a priority for you, and I thank you for your leadership and work on this issue.

I would agree with my colleagues that Federal laws governing the use of chemicals—including the Toxic Substances Control Act and the Flammable Fabrics Act—should be modernized. But we must do so in a manner that is warranted, protects public health, employs a transparent science-based process that takes into account relative risks, provides appropriate safeguards for intellectual property and proprietary information, and appropriately considers cost.

The United States has a vibrant chemicals industry generating over $720 billion each year in products, employing over 800,000 Americans, and providing millions of other related jobs. Our nation's chemical sector is a global leader, and we need a regulatory framework that keeps it that way, while also protecting public health and the environment.

The testimony of today's witnesses focuses primarily on concerns with chemical flame retardants. Fire deaths are a major concern in my State. In 2009 Alabama ranked #3 among the 50 States in the rate of fire-related deaths, with approximately 21 fire-related deaths per 1 million people. The national average in 2009 was 11 deaths per million people. According to the Centers for Disease Control and Prevention, "deaths from fires and burns are the third leading cause of fatal home injury." While more progress is needed, the national fire death rate has declined approximately 20 percent since 2000.

Studies have shown that flame retardants can be effective at making homes, clothing, furniture, and electronics less prone to catching fire—although it is also true that not all flame retardants are without health concerns. For example, in 2005 the furniture industry voluntarily phased out the use of PBDEs (polybrominated diphenyl ethers)—a chemical that has been used as a flame retardant in textiles, plastics, wire insulation, automobiles, and other applications. Likewise, around the same time, EPA issued a rule banning the manufacture or import of two chemicals in the same chemical family as PBDEs. And presently, EPA has additional rulemaking procedures underway related to flame retardants. It is absolutely critical for public health, safety, and economic competitiveness that any such rules be based on sound science.

Finally, I wanted to read from the testimony of the CEO of the American Home Furnishings Alliance, who testified at last week's Senate Appropriations subcommittee hearing on this same topic. That witness stated, "[C]ost must be a consideration. The statistics of residential fires have told us repeatedly over the years that the residential fire problem in the United States primarily lies in households with lower incomes, less education, and a higher proportion of single parents. This segment of the population is the most sensitive to cost increases, yet this segment is clearly the most in need of the protection that safer upholstery will provide . . . "

Thank you again for holding today's hearing. I look forward to hearing from our witnesses.

[Additional material submitted for the record follows:]

CAL DOOLEY
PRESIDENT AND CEO

July 20, 2012

Mr. John Martell
President
Professional Fire Fighters of Maine
41 Brickyard Cove Rd.
Harpswell, Maine 04079

Dear Mr. Martell:

I am writing in response to your recent letter regarding flame retardants. The American Chemistry Council and our member companies have great respect for the critical work you do, and share your interest in pursuing safe and effective ways to prevent the spread of fires.

Albemarle Corporation, Chemtura Corporation and ICL Industrial Products have great confidence in their chemistries, supported by substantial testing and studies on safety and efficacy. However, they understand that recent news stories should be addressed in order to dispel misinformation. To that end, they will continue to share data that supports the safety and efficacy of their products in the markets they supply with regulators and the public, and I would encourage you to review information about these products available on the company websites.

Please note that, while the three companies that produce flame retardants are long-time members of the American Chemistry Council, we are not affiliated with Citizens for Fire Safety, and neither ACC staff nor its resources were used to support activities undertaken by the group.

To increase public confidence in the safety of chemicals in consumer products, ACC continues to support bipartisan reform of the federal chemical regulatory system that will protect health and safety while ensuring U.S. manufacturers can innovate and compete globally. ACC has consistently called for a bipartisan process to modernize the Toxic Substances Control Act, and we have been encouraged by the mid-June agreement between Senator Lautenberg and several Republican Senators, led by Senator David Vitter, to put aside existing proposals and develop a new approach. We remain hopeful that this bipartisan process will yield a bill that can be supported by all stakeholders and become law.

Sincerely,

Cal Dooley

WALTER MOORE
VICE PRESIDENT
FEDERAL AFFAIRS

American Chemistry Council

July 25, 2012

The Honorable Barbara Boxer
Chairman, Committee on Environment and Public Works
United States Senate
Washington, DC 20510

The Honorable Frank Lautenberg
Chairman, Subcommittee on Superfund, Toxics and Environmental Health
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

Dear Chairmen Boxer and Lautenberg:

Modernizing the Toxic Substances Control Act (TSCA) is a top priority of the American Chemistry Council (ACC) and our members companies. To make that goal a reality, we have been engaged in numerous Subcommittee and Committee stakeholder discussions to construct a workable, science-based legislative proposal, offering extensive, detailed suggestions on how to improve TSCA. We also worked extensively during the winter and spring with Members of both parties to help launch the first bi-partisan TSCA negotiation process, beginning from a blank slate. That process was fully underway in mid-June before being interrupted after only four weeks by a decision to instead to move forward with the July 25th Committee markup of the Safe Chemicals Act.

During the July 24th Senate Committee on Environment and Public Works hearing entitled "Oversight of EPA Authorities and Actions to Control Exposures to Toxic Chemicals," several troubling statements were made concerning supposed ACC engagement in advocacy in the state of Maine, with activities of groups unaffiliated with ACC being erroneously attributed to ACC. Those allegations, stated as facts, were inaccurate.

During the hearing, questions were also raised regarding whether or not ACC responded to a letter from the Professional Firefighters of Maine regarding flame retardants. We would like to submit the enclosed response to the firefighters that we hope will help set the record straight that ACC did in fact respond to their correspondence.

To foster the type of bi-partisan collaborative process required to achieve TSCA reform, we believe it is important that future hearings focus on addressing important public policy issues, rather than questioning ACC's long-standing commitment to public health and safety.

It is not surprising that much work needs to be done to address the myriad of issues associated with updating a statute as complex and far reaching as TSCA. We remain committed to working with the Senate Committee on Environment and Public Works to help create a world-class regulatory framework that will ensure the safe use of chemicals while fostering American innovation and job growth.

Sincerely,

Walter Moore