

## TOXIC AND HAZARDOUS SUBSTANCES LITIGATION

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*Bob Redmond, Chair of the IADC's Toxic and Hazardous Substances Litigation Committee, provides a brief overview of toxic tort issues related to the use of spray polyurethane foam, including its potential health effects and liability issues that may arise for manufacturers, distributors, and applicators.*

## Toxic Tort Issues Related to Spray Polyurethane Foam

### ABOUT THE AUTHOR

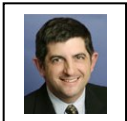


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### ABOUT THE COMMITTEE

Member participation is the focus and objective of the Toxic and Hazardous Substances Litigation Committee, whether through a monthly newsletter, committee Web page, e-mail inquiries and contacts regarding tactics, experts and the business of the committee, semi-annual committee meetings to discuss issues and business, Journal articles and other scholarship, our outreach program to welcome new members and members waiting to get involved, or networking and CLE presentations significant to the experienced trial lawyer defending toxic tort and related cases.

Learn more about the Committee at [www.iadclaw.org](http://www.iadclaw.org). To contribute a newsletter article, contact:



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This article provides a brief overview of spray polyurethane foam ("SPF"). Spray polyurethane foam is an increasingly popular method to insulate residential homes and other structures. The insulating foam, (which can be readily applied to walls, ceilings and narrow joists), has been linked with serious respiratory illnesses. Already there are lawsuits pending around the country related to SPF.

This article will examine:

- The use and chemical composition of SPF;
- The history of SPF;
- Its health effects and preventative measures to mitigate health effects and;
- Liability issues.

### **SPF: What Is It?**

Spray polyurethane foam is a highly effective insulating material. It has an R-value of between 3.5 and 6.5 per inch. This makes SPF substantially more insulating than standard fiberglass insulation. Additionally, SPF can be sprayed into tight spaces, including attics, crawlspaces, and walls. Builders describe SPF insulation as "one of the fastest growing products in construction."

There are two types of SPF: open cell and closed cell. Open cell SPF is made up of small cells that are not completely enclosed. Open cell SPF is less expensive because it uses fewer chemicals. It also has a lower R-value. The R-value of open cell foam insulation is about 3.5 per inch. Open cell foam insulation does not

provide a water vapor barrier. It has a sponge-like appearance. It is typically limited to interior walls.

By contrast, closed cell foam insulation is much more dense. Its cell structure is small and compact. Each cell is a closed insulating unit. It provides excellent air and water barrier capabilities. It is typically used in attics, roofs, and exterior walls. It has a much higher R-value -- 6.5 per inch.

SPF has become very popular because it helps builders comply with LEED building standards. Additionally, closed cell SPF provides a moisture barrier, noise damping, and prevents air infiltration. Consequently, many local jurisdictions provide substantial tax credits to homes that use SPF insulation.

### **Chemical Composition**

SPF is made of two chemical combinations. These are generally referred to as "Side A" and "Side B." Side A is composed of isocyanates. The principal isocyanate used in SPF is methylene diphenyl diisocyanate; better known as "MDI."

Side A is combined with Side B in an aerosol mixture. Side B is a polyol blend that basically acts as binder for the isocyanates. The polyol blend often contains bio-based components including soybean oil. Side B also typically contains components that assist the formation and durability of the foam insulation. These additional components would include flame retardants, blowing agents, amine or metal catalysts, and surfactants.

SPF is formed when Side A and Side B are sprayed together using a spray nozzle with two feeder hoses. The chemicals are dispersed simultaneously in a controlled formula. Side A combines with Side B in the application process. The chemical combination cures to touch in about 10 to 15 minutes. It fully cures in about 24 to 72 hours.

### **History of SPF**

SPF was first developed by the German Air Force at the end of World War II. It was used primarily as a means of stabilizing the wings of German aircraft as the Germans ran out of steel and aluminum.

SPF was used in commercial aircraft in the 1970s as both an insulating material and to provide structural integrity. SPF was used in residential construction in Canada starting in the 1970s. It became widely used in residential construction in the United States starting in the 1990s. In the 1990s, SPF was also introduced as a liner for pickup truck beds in an application known as "Truck Bed Lining" ("TBL"). SPF protected the truck bed and also loose cargo in the bed. It also provided some noise-damping in the bed.

### **Background on Health Effects**

SPF chemicals -- Side A and Side B -- are both associated with health hazards. Side A chemicals -- isocyanates -- are highly associated with respiratory diseases. Isocyanates can be hazardous both during application of SPF and later, after application. MDI, the isocyanate most frequently used in SPF, is actually the least toxic of the isocyanates. Other

isocyanates -- TDI and HDI -- are much more toxic than MDI.

Side B chemicals -- the polyol blend -- are associated (more weakly) with endocrine disruption and neurological effects.

### **Health Effects of Isocyanates**

Isocyanates are highly reactive chemicals. Isocyanates are produced by treating amines with phosgene -- a gas used in the trenches during World War I.

Exposure to isocyanates can cause skin, eye, and lung irritation as well as asthma and immuno - sensitization. The EPA has described isocyanates as the "leading attributable cause of work-related asthma." The EPA has also stated that there is no recognized safe level of exposure to isocyanates for sensitized individuals.

### **2006 NIOSH TBL INVESTIGATION**

In September, 2006, The National Institute of Occupational Safety and Health ("NIOSH") published a study examining the risk of asthma and death from SPF used in truck bed lining applications. (DHHS (NIOSH) Publication Number 2006-149, September 2006.) NIOSH held as follows:

Isocyanates have been reported to be the leading attributable chemical cause of work-related asthma, a potentially life-threatening disease.

NIOSH went on to find:

Exposure to isocyanates can cause contact dermatitis, skin or respiratory tract irritation, sensitization and asthma.

NIOSH found that these responses can be caused by both skin and inhalation exposure. NIOSH noted that allergic or sensitized reactions to isocyanates can trigger asthma or even a potentially fatal lung reaction. NIOSH found that there is "no recognized safe level of exposure to isocyanates for sensitized individuals."

Further, NIOSH found that "sensitization may result from either a single exposure to a relatively high concentration or repeated lower concentration exposures over time."

NIOSH found that exposure to isocyanates, even when it does not result in sensitization, can lead to long-term lung and respiratory problems. NIOSH stated that "all skin contact should be avoided since contact with skin may lead to respiratory sensitization or cause other allergic reactions."

More recently, NIOSH linked its 2006 Truck Bed Lining Study to a study of spray polyurethane insulating material. It concluded that the two applications (TBL and SPF) are "essentially the same." NIOSH studies provide ample foundation for a mass tort litigation related to SPF.

NIOSH's findings are consistent with other governmental regulatory bodies. The Environmental Protection Agency considers MDI an air pollutant under the Clean Air Act, and the European Union has issued strict new regulations for consumer products containing MDI.

### **Health Effects of Polyol Blend**

There are fewer concerns about polyol blend. Some of the catalysts in polyol blend may cause blurred vision. Some of

the flame retardants in polyol blend may be bio-cumulative (that is – they may cause health effects because they accumulate in the body over time.) Additionally, some surfactants have been linked to endocrine disruption.

### **Exposure Pathways**

Individuals can be exposed to the chemicals in SPF in a variety of ways. First and foremost, SPF is applied as an aerosol vapor. The Side A and Side B chemicals are sprayed out of a dual reservoir spray gun under high pressure. Consequently, the isocyanates envelope the applicator and can migrate to other work areas.

Additionally, after the SPF has formed a foam and cured, workers typically have to cut and scrape the cured foam from structural features such as studs in walls and joists in attics. The process of cutting and scraping the cured foam generates dust particles that contain respirable isocyanates.

Additionally, there is evidence that, over time, as SPF degrades, it generates free isocyanates that are released into the atmosphere. This exposure route is magnified when the cured SPF is heated, ground, or welded.

### **Deficiencies in Material Safety Data Sheets**

OSHA found that Spray Polyurethane Foam MSDS forms are typically inaccurate, as they do not adequately describe the hazards associated with SPF. OSHA found that very few MSDS have a warning for exposure to nearby workers. Almost no MSDS forms recommend that

adjacent workers use respiratory protection, and few MSDS forms have guidelines for adequate ventilation. OSHA found that most MSDS forms make no mention of allergic reactions of sensitization. Most MSDS identify the hazard of SPF as "mechanical irritation" (scratching and dust). Virtually none of the MSDS forms mention the presence of isocyanates in dust from dried SPF.

### **Consumer Product Safety Commission**

SPF has recently been introduced to the "Do-It-Yourself" market in small, spray foam canisters. Consumers may not be aware of the high levels of hazard associated with SPF.

"DIY" Spray Polyurethane Foam insulation kits are consumer products governed by the Consumer Product Safety Act and the Federal Hazardous Substances Act. Under the Federal Hazardous Substances Act, the term "hazardous substance" is defined as "any substance or mixture of substances which is toxic; an irritant or is a strong sensitizer".

SPF probably qualifies as a "hazardous substance" under the Federal Hazardous Substance Act.

### **Application Issues**

There seems to be a relationship between the toxicity of SPF and the manner of application. Most SPF manufacturers recommend (even require) that their product only be applied to surfaces that are clean, dry and free of dew or frost. All metal surfaces must be free of oil or grease. The manufacturers advise that applicators allow each "coat" of sprayed SPF to rise at least six inches before

applying a second "coat". Additionally, the manufacturers typically require that ten minutes pass between each "coat." These requirements are very difficult to monitor in the field, particularly in residential construction.

Improper application techniques include:

- Excessive thickness of spray;
- Improper ratios between Side A and Side B;
- Spraying into rising SPF foam;
- Mixing dissimilar product types.

Improper application can lead to dangerously high reaction temperatures and off-gassing. To prevent respiratory injury during application of SPF, NIOSH has published preventative measures which require enclosures and ventilation for the application of SPF. OSHA also requires extensive education and training for workers applying SPF. Workers applying SPF must wear a full level of personal protective equipment, including:

- a full saran-coated body cover (no exposed skin);
- gloves; and
- full respirator with full mask.

NIOSH also recommends that helpers and adjacent workers have similar protection.

### **Liability Issues Related to SPF**

The liability issues related to SPF include the following:

#### **Failure to Warn**

NIOSH studies expressly link isocyanates to debilitating, potentially fatal asthma.



OSHA and the NIOSH have both identified the MSDS forms as inadequate at identifying the hazards associated with isocyanates. Further, both NIOSH and OSHA have identified no safe level of exposure to a sensitized individual. Both agencies have concluded that sensitization can occur with a single short term high exposure use. Finally, the developing consumer market seems to provide little or no education to SPF consumers about the hazards associated with SPF and methods to reduce the hazard.

EPA has concluded that there may be "long tail" exposure to SPF because cured SPF can generate respirable isocyanates when cut, heated or otherwise disturbed. Potential plaintiffs may also be able to allege fraud, as the EPA has found certain marketing claims related to SPF to be inaccurate. These include claims that SPF is "non-toxic," "safe," and "environmentally friendly."

### **Litigation**

Currently, there are between eight and eleven SPF cases pending nationwide. The plaintiffs made an effort to consolidate the litigation in a federal multi-district litigation. However, the Judicial Panel on Multi-District Litigation refused to form an MDL.

The defendants in these cases are the manufacturers, distributors, general contractors, and applicators. There is some conflict between the SPF manufacturers, on the one hand, and the SPF distributors,

the general contractors and the SPF application companies, on the other hand. The plaintiffs claim fraud, negligence, negligent supervision (of applicators), strict liability, breach of express and implied warranty, and breach of consumer protection statutes. The Plaintiffs seek complete remediation, medical monitoring and punitive damages.

The plaintiffs allege, in their complaints that SPF can only be safely applied in "near laboratory-like conditions" to properly cure. Even then, there is a risk of isocyanate exposure.

The defendants, on the other hand, point out that SPF has a long history of use, and the isolated cases of isocyanate exposure are related to lack of training or negligence on the part of the individual applicator.

### **Conclusion**

SPF insulation is widely used. Applicators and adjacent workers require the highest level of personal protective equipment, but often do not get it. It is clear that SPF exposure can lead to fatal lung disease. Further, a single exposure may cause sensitization, and there is no safe level of exposure after sensitization. In summary, SPF insulation has many of the elements of the classic mass tort. Plaintiffs' groups are already forming. Potential defendants should take immediate steps to limit their exposure.

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