

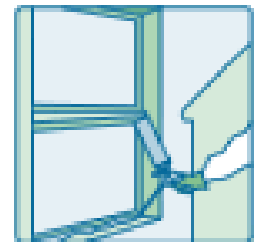
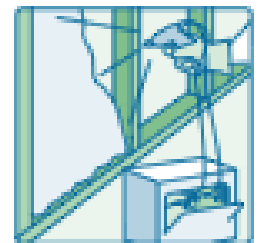
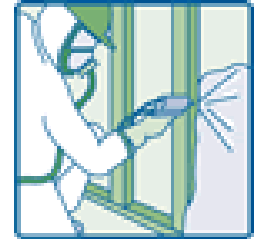
NOTE:

Please proceed to the next page for the joint presentation dated December 2009.

For the most current information from EPA, also visit

EPA's Spray Polyurethane Foam website at:

http://www.epa.gov/dfe/pubs/projects/spf/spray_polyurethane_foam.html





What You Need to Know About the Safe Use of Spray Polyurethane Foam (SPF)

Briefing on Spray Polyurethane Foam

*Note: American Board of Industrial Hygiene (ABIH)
Certification Maintenance (CM) Points:
Approval # 09-4284, for .25 CM
For registration and attendance at any 2009
“What you Need to Know About the Safe Use of Spray
Polyurethane Foam (SPF)” Briefing or Webinar*





Why is this Issue Important?

- SPF is one of the fastest growing products in building and construction. (Reuters 2009).
- Investing billions of dollars to promote energy efficiency and green jobs.
- Widespread use of SPF to retrofit buildings to conserve energy, the entire industry needs to ensure that SPF installation is carried out in a safe manner.



Spray Polyurethane Foam Benefits

- Energy Savings Attributes

- **High R-value**
- **Moisture barrier (closed cell)**
- **Fills gaps and crevices**
- **Stops air infiltration**
- **Thermal break**

Federal SPF Workgroup:

- EPA
- NIOSH
- OSHA
- CPSC



Industry Workgroup:

- American Chemistry Council (ACC) – Center For Polyurethane Industries (CPI)
- Spray Polyurethane Foam Alliance (SPFA)





Presenters

- **Carol Hetfield, Environmental Protection Agency**
 - Introduction, Goals
- **Mary Cushmac, Environmental Protection Agency**
 - Hazards and Potential for Exposures
- **Janet Carter, Occupations Safety & Health Administration**
 - An OSHA Perspective on Employer Responsibilities
- **Daniel Almaguer, National Institute for Occupational Safety and Health**
 - Spray Polyurethane Processes and Best Practices
- **Trey Thomas, Consumer Product Safety Commission**
 - Assessing Health Risks in Consumer Products
- **Kurt Riesenber, Spray Polyurethane Foam Alliance**
 - Benefits of SPF & Enhanced Stewardship
- **Jim Chapman, Bayer MaterialScience LLC**
 - *A Technical Discussion on SPF*
- **Neeva-Gayle Candelori, American Chemistry Council-CPI**
 - Next Stage of CPI-SPFA Spray Polyurethane Foam Product Stewardship Program



SPF Project Goals

- **Improve availability of accurate and comprehensive hazard & risk information**
- **Develop and communicate “Best Practices” to prevent exposures**
- **Address inaccurate or misleading marketing claims**
- **Address exposure assessment and data gaps**



Misleading Marketing Claims (Goal 3)

- **“No off-gassing”, “non-toxic”, “safe”**
- **“green” and “environmentally friendly”**
- **“is plant-based”, “made from soy beans”**

- **Federal Trade Commission**
 - Federal law prohibits deceptive acts or practices, including deceptive representations in advertising, labeling, product inserts, catalogs, and sales presentations.
 - FTC Green Guides – provide guidance.



Spray Polyurethane Foam (SPF) - Hazards and Potential Exposures

**Mary Cushmac
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency**



Chemical Composition of SPF

- Side A – Isocyanates
 - Methylene diphenyl diisocyanate (MDI)
 - pMDI (50% MDI)
- Side B – Polyol Blend (variable/proprietary)
 - Polyols (certain % biobased)
 - Flame retardants
 - Blowing agents
 - Amine or metal catalysts
 - Surfactants

A + B → POLYURETHANE FOAM



Health Effects - Isocyanates (Side A)

- **Isocyanates cause asthma and are the leading attributable cause of work-related asthma.**
- **Isocyanates are potent lung and skin sensitizers (allergens) and irritants.**
- **Isocyanates can trigger severe or fatal asthma attacks in sensitized persons at low levels.**
- **MDI is a hazardous air pollutant – Clean Air Act.**
- **NIOSH issued an Alert in 2006 to prevent MDI exposures for a similar spray application.**
- **The European Union has issued new regulations for consumer products containing MDI.**



Potential Health Effects - Polyol Blend (Side B)

Proprietary Chemical Ingredients:

- **Amines (catalysts) – sensitizers; irritants; can cause blurry vision (halo effect).**
- **Flame retardants – some are persistent, bioaccumulative, and toxic**
- **Blowing agents – global warming potential and other considerations**



SPF Sealants & Insulation

- Two-Component: U.S. production reached 365 million lbs. in 2008*.
 - Professional: 55 gal. drums
 - Do-It-Yourself: 2-component kits (200 board ft., 600 board ft.)
 - Retail, hardware, internet purchase

- One Component: U.S. production reached 55 million lbs. in 2008* (fills, seals, and insulates gaps)
 - Consumer
 - 12 oz. can (market leader); also 16 oz., 24 oz.
 - Plastic straw applicator included
 - Professional & Do-It-Yourself
 - 12 oz. can (market leader); also 16 oz., 24 oz.
 - Typically gun delivery or applicator tool for precise control, sold separately.

**2008 End Use Market Survey on the Polyurethanes Industry in the U.S., Canada, and Mexico, ACC Center for the Polyurethanes Industry, October 2009.*



SPF Insulation Products

Open Cell

- Low Density
- Expands aggressively
- Dries soft
- Lower R-value (~ 3.5 per inch)

Closed Cell

- High Density
- Expands less aggressively
- Dries rigid
- Higher R-value (~ 6.5 per inch)

Exposures – Spray Application

- **Generates vapor, mist, and particulates exceeding exposure limits. Isocyanates & amines can migrate to other rooms or floors.**



Exposures – Trimming Foam

- Cutting, scraping foam that is not fully cured generates dust, particles that may contain isocyanates.



Exposures: Consumer & Do-It-Yourself Projects

- Consumers, a growing market of Do-it-Yourself applicators, are using spray foam cans or two-component kits for sealing cracks, as insulation, or creative arts.
- Users are often unaware of the hazards and the need to prevent skin, eye and inhalation exposures, and the proper type of protections to use.





Other Considerations

- **Long term stability of polyurethane foam:**
 - **Fully cured polyurethane foam is not considered a problem unless disturbed.**
 - **Heating, welding, or grinding generates free isocyanates and other hazards.**
 - **Fires and thermal degradation can generate and release hydrogen cyanide, carbon monoxide, amines, and isocyanates.**



Assessing Exposures

- **Data are needed to accurately assess the potential for exposures with variable applications & product formulations:**
 - **Measuring total isocyanates.**
 - **Other substances.**
 - **Answering the question – When can occupants, residents, and school children safely re-enter the premises after SPF application?**



Hazard Communication and Right-to-Know

- **Many applicators, helpers, do-it-yourselfers, consumers, homeowners, and decision makers are unaware of the potential hazards.**
- **Some marketing information is misleading – focuses on “green” aspects and does not address potential hazards.**
- **Material Safety Data Sheets do not contain consistent health and safety information.**
- **All products should be properly labeled by manufacturers/distributors (FHSA requirement).**



Hazard Communication and Right-to-Know

- **The SPF industry needs to ensure:**
 - **There is clear hazard communication for all SPF users – applicators, helpers, do-it-yourselfers, consumers, and decision makers.**
 - **Consumers are not usually familiar with MSDS and need clear hazard warnings.**
 - **The work site is restricted to only those wearing appropriate personal protective equipment.**
 - **Guidance is provided on re-entry time.**
 - **Marketing claims are accurate and balanced.**



Alternative Technologies

- Fiberglass, cotton, and mineral wool batts.
- Fiberglass and cellulose mixed with an adhesive can be wet sprayed into wall cavities and have an R-value per inch similar to low density SPF.
- Polyisocyanurate rigid foam boards can have similar R-values per inch as high density (2 lb) SPF.
- Cementitious and tripolymer foam products can be poured into walls or behind special netting.
- A new class of hybrid non-isocyanate polyurethanes (HNIPU) in development



**Occupational Safety
and Health Administration**



UNITED STATES DEPARTMENT OF LABOR

Considerations for Safe Use of Spray Polyurethane Foam (SPF): An OSHA Perspective

Janet Carter

Health Scientist

Directorate of Standards and Guidance



OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION

OSHA's Role and Responsibilities

- Agency Mission – “assure safe and healthful working conditions for working men and women”
 - Safety and Health Standards
 - Enforcement of Standards
 - State assistance
 - Provide research, training, education, information



OSHA's Concern with SPF

- Linked to Work-related asthma (WRA)
 - Asthma serious condition
 - Can worsen with each exposure
 - May be life threatening
- Hazard information not reaching all users
 - Inconsistent worker protection



OSHA Applicable Standards

- 3 PELS for isocyanates
 - 29 CFR 1910 subpart Z (Air contaminants)
- General duty clause



OSHA Applicable Standards

- 29 CFR 1910.1200; 1915.1200; 1917.28; 1918.90; and 1926.59 (Hazard Communication)
- 29 CFR 1910.134 (Respiratory Protection)
- 29 CFR 1910 Part I, 1926.95 (Personal Protective Equipment)
- 29 CFR 1910.94; 1915.51; 1918.94; 1926.57 (Ventilation)



Employer Responsibilities

- Full Hazard Communication
- Provide worker training
- Appropriate Exposure Control System
 - PPE for **ALL** exposed workers
 - Adequate and appropriate containment and/or ventilation
 - Develop best practices for handling these and **ALL** hazardous materials



Hazard Communication

- Communicate all hazards via:
 - MSDS
 - Labeling of all hazardous substances
 - Warning signs of hazards
- Employee training



Hazard Communication - MSDS

- Material Safety Data Sheets
 - Integral part of communication strategy
 - Must be readily available to **all** affected workers
 - Must be comprehensive

- Issues with accuracy, consistency and completeness



Hazard Communication - MSDS

MSDS – current deficiencies and inconsistencies

- **Hazard and exposure control information varies widely**
- **Recommendations on respiratory protection vary**
- **Only a few MSDSs mention the possible need for respiratory protection for “adjacent workers.”**
- **MSDSs indicate that adequate ventilation is needed but provide no guidance or suggestions on ventilation methods or what constitutes adequate ventilation**
- **Few MSDSs mention that skin contact may cause an allergic reaction/sensitization**
- **Several MSDSs mention that dust can be generated during cutting or abrasive processes, however, hazards are identified as “mechanical irritation” and do not mention the possible presence of MDI**



Hazard Communication - MSDS

MSDS – more complete information

- Identify known hazards and exposure routes
 - Includes skin and other relevant health effects beyond asthma
- Identify appropriate first-aid and medical measures
- Identify appropriate exposure controls and PPE (skin and respiratory)
- Address need for adequate containment and ventilation
 - Includes use of filters (bed-liner guidance)
 - May also include generation of dust – may contain isocyanates



Hazard Communication

- MSDS from manufacturers
 - Information should **not** be deleted down the supply chain
 - User accepts liability if change information

- What if a worker or adjacent person is harmed because of inadequate or altered information?



Hazard Communication – New Communication Rule

- **Current** - Hazard Communication – 29 CFR 1910.1200 (general industry)
 - Others apply for construction; maritime; long shore
- **New** - Global Harmonization System (GHS)
 - Proposed rulemaking
 - For MSDS
 - ANSI 400 standard
 - 16 Section format
 - Already in use with current standard
 - Comment period ends December 29
 - Announcement for public hearings soon



Training

- Employers need to train workers on:
 - Hazards associated with use of **ALL** hazardous chemicals including Isocyanates and SPF
 - Proper control measures
 - Proper use of PPE
 - Protecting those in adjacent areas
 - Appropriate ventilation



Training

- Training should be available to all appropriate workers

- Training material is available on web:
 - OSHA
 - NIOSH
 - ACC/Polyurethane Industry



Appropriate Exposure Control

- Exposures should be controlled whenever possible
 - PPE should be last resort
 - Problems with compliance
 - Need for education and training
- Consider all phases of operation
 - Start to finish, including clean-up
 - Consider use of PPE for clean-up crew
 - Same as operator/helper
- Develop best practices for work activities
 - Enclosures or partitions
 - Dust control measures
 - Proper air circulation and ventilation



Exposure Control - Proper Use of PPE

- Primary worker (spray applicator):
 - Full saran-coated body cover (no exposed skin)
 - Gloves
 - Appropriate respirator with full face mask
- **Helpers** (need to evaluate on case-by-case basis)
 - Full skin protection and gloves (no skin exposed)
 - Full face mask
- Adjacent workers
- Train **ALL** workers - training is essential
 - Consider developing checklist to ensure compliance



Ventilation Considerations

- Ventilation crucial for worker safety
- Only vent to outside using approved filter
 - Protect workers or passer-by's outside
 - Similar methods can be adapted from measures used in truck bed-liner industry, see OSHA issued publications in alliance with CPI for Truck Bed-liners (**developed for employers, the documents includes information on how to recognize MDI-related hazards and reduce employees' exposure to MDI**)
 - *“Spray on Truck Bed Liner Applications Using MDI/PMDI; Seven Important Points”* and
 - *“Considerations for the Application of Spray-On Truck Bed Liners”*
 - Similar hazards
 - Similar remedies



Additional Information

- **OSHA assistance**
 - **OSHA has free consultation program**
 - Small and medium sized businesses
 - **All 50 states participate & Regions have been alerted**
 - **“Full service consultation“: Covers all working conditions, includes assistance in establishing effective workplace safety and health programs, with emphasis on preventing worker injuries and illnesses. Assistance may also include training and education for the employer and his or her employees and supervisors as well.**
 - **“Limited service consultation“: Consultant focuses on more specific workplace problems or specific issues or hazardous processes relating to a particular business**
 - **Information available on website: www.osha.gov**

- **DOL and OSHA are working to include safety and health as key message in “Green” jobs training programs**
 - **Promote safe use of these materials in the workplace**

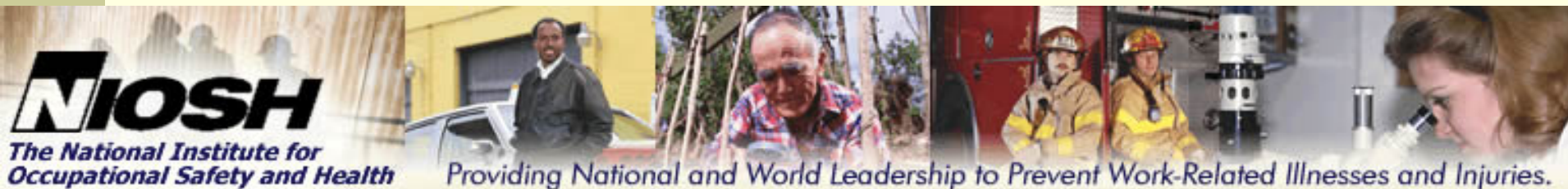


Spray Polyurethane Processes

Daniel Almaguer, M.S.

National Institute for Occupational Safety and Health (NIOSH)

Disclaimer: The findings and conclusions in this presentation are those of the author(s) and do not necessarily represent the views of the National Institute for Occupational Safety and Health (NIOSH). Mention of company names or products does not constitute endorsement by the Centers for Disease Control and Prevention (CDC) or NIOSH.



Who is NIOSH?

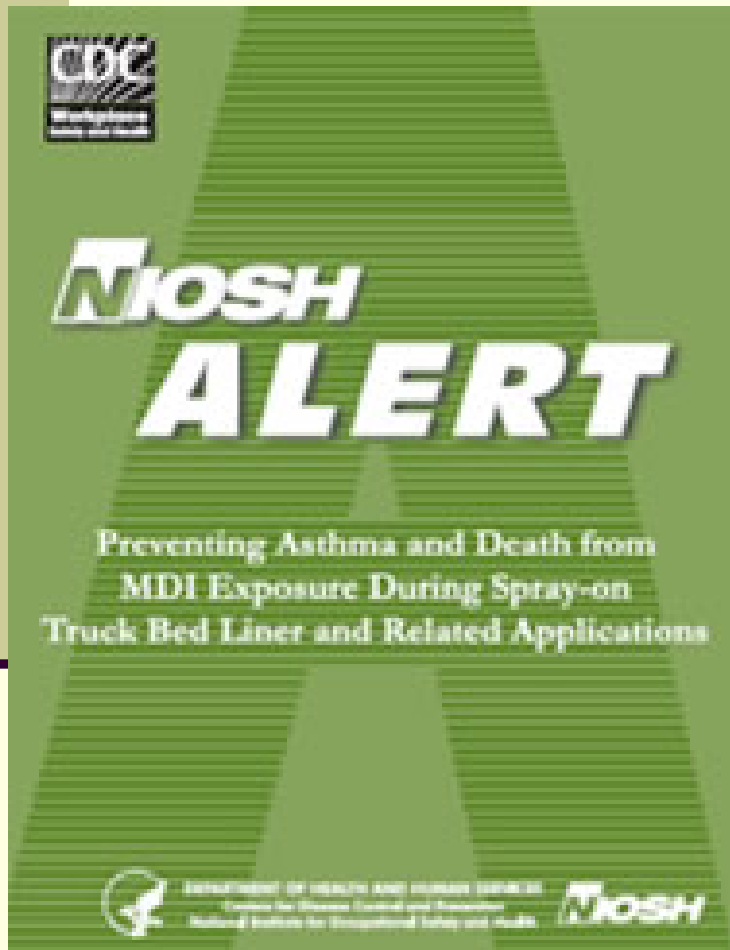
- The National Institute for Occupational Safety and Health
- Created under the OSHA Act of 1970
- **Mission** – ensure safety and health at work for all people through research and prevention.
 - Responsible for conducting occupational safety and health research.
 - Education and Training.
- To provide leadership in research to prevent work-related illness, injury, disability, and death.

Division of Applied Research & Technology

Engineering & Physical Hazards Branch

- Engineers, Industrial Hygienists, Physicists, other disciplines.
- Identify and evaluate occupational exposures
- Develop and evaluate engineering controls for preventing or reducing exposures
- Disseminate information on hazards, exposures, and control solutions to industry and professionals

NIOSH Alert on Truck Bed-Liners Applicable to all SPF Operations



Contains Recommendations for:

- Workers
- Employers
- Future Research
- Engineering controls
- Exposure monitoring
- Respiratory protection
- Medical monitoring
- Surveillance
- Decontamination

Why NIOSH issued Alert

- Reports of occupational asthma – detailed in NIOSH Alert.
- Isocyanates – **cause occupational asthma.**
- Workers with **asthmatic symptoms** from isocyanate exposure **often continue** to have symptoms even after exposures have ended.
- Affected workers often **have to leave their jobs** to prevent progression of respiratory symptoms.

NIOSH Assessment of Spray Polyurethane Products Industries

- Comprehensive study of the spray polyurethane truck bed-liner (TBL) process (2003-2006).
- Preliminary assessment of the Spray Polyurethane Foam (SPF) insulation process - 4 sites (Aug. 2009).
- Review of industry information on the SPF process.
- **Concluded that based on the similarities --these two spray polyurethane processes (TBL and SPF) are essentially the same (i.e. same chemicals and equipment).**

Importance of worker issues

- Worker exposures not always considered in developing “green” products and practices.
- Workers/applicators generally have higher exposures compared to homeowners or consumers.
- Controls and training to reduce worker exposures generally likely to reduce exposures for homeowners.
- A truly comprehensive approach to sustainability and green practices needs to include occupational safety and health aspects.



Industrial Hygiene

Hierarchy of controls

- Elimination
- Substitution – replace high hazard with low hazard
- Engineering – ventilation, enclosure
- Administrative – training, job rotation, procedures, policy
- Protective Clothing and Equipment – respirators, ear plugs, gloves

SPF Recommendations

- Hazard Communication
- Wear Personal Protective Equipment (PPE)- sprayer and helper.
 - Full-Face Supplied-Air Respirator (SAR)
 - chemical protective clothing (i.e. disposable coveralls and gloves).
- Limit access to spray area.
 - Only trained workers with proper PPE.
- Isolate process to prevent chemical migration to other areas to ensure others are not exposed.
- Provide adequate ventilation to remove chemicals.
 - Exhaust to unoccupied area.
 - Prevent access to exhaust area.
- Do not re-enter spray area without appropriate PPE.
 - Need to determine appropriate time period.

Use of PPE at SPF sites

Implementation Gap

- **Gap between what we know and what workers do.**
- Studies – worker exposures exceed the occupational exposure limits (OELs).
- Studies – appropriate PPE not consistently used.
 - SAR consistently used by sprayers at all NIOSH SPFI walk-thru sites.
- Studies – use of chemical protective clothing (coveralls, gloves, booties) by helpers was inconsistent.
- Ensure consistent use of PPE throughout industry – respiratory, eye and skin.

Initial Assessment of SPF

- The industry has a wealth of information on spray polyurethane products.
- **Published studies indicate that the information is not consistently reaching the worker.**
- We need to work collaboratively to protect the health of the SPF workforce and the consumer/occupant.
- Ensure that correct information gets to the workers.

Challenges for SPP industries

- Develop engineering control strategies to protect all workers during all phases of the operations.
 - Preparation
 - Spraying
 - Trimming
 - Clean-up.
- Controls need to be adaptable to a wide variety of applications and foam densities.
 - Indoor and outdoor
 - New construction and retrofits
 - Residential (attic retrofits)
 - Commercial
 - ½-pound (low density), 2-lb. (medium), and 3-lb. (high) foams

Challenges for SPP industries

- Develop strategies to isolate (enclose) process.
 - Prevent migration of chemicals to other areas.

- Develop ventilation system for enclosures.
 - Reduce airborne chemicals including MDI.
 - Air supply and exhaust needed.
 - Exhaust to unoccupied location.

- Determine appropriate time(s) period to re-enter areas without PPE.
 - Dependent on ventilation rate.

Potential Controls used at SPF sites

- Explore ways to isolate (enclose) process.
 - Used plastic sheeting to cover wall studs.
 - Used metal grating to control expansion of foam.
 - Potential advantages – reduced chemical usage; chemical vapors and aerosols likely trapped behind plastic film resulting in lower airborne chemical concentrations.



Panel system



Controls used at SPF sites

- Use air movers to exchange air in the spray zone.
 - ✓ Reduce airborne chemical concentrations.
 - ✓ Air supply and exhaust needed.
 - ✓ Exhaust to unoccupied location.

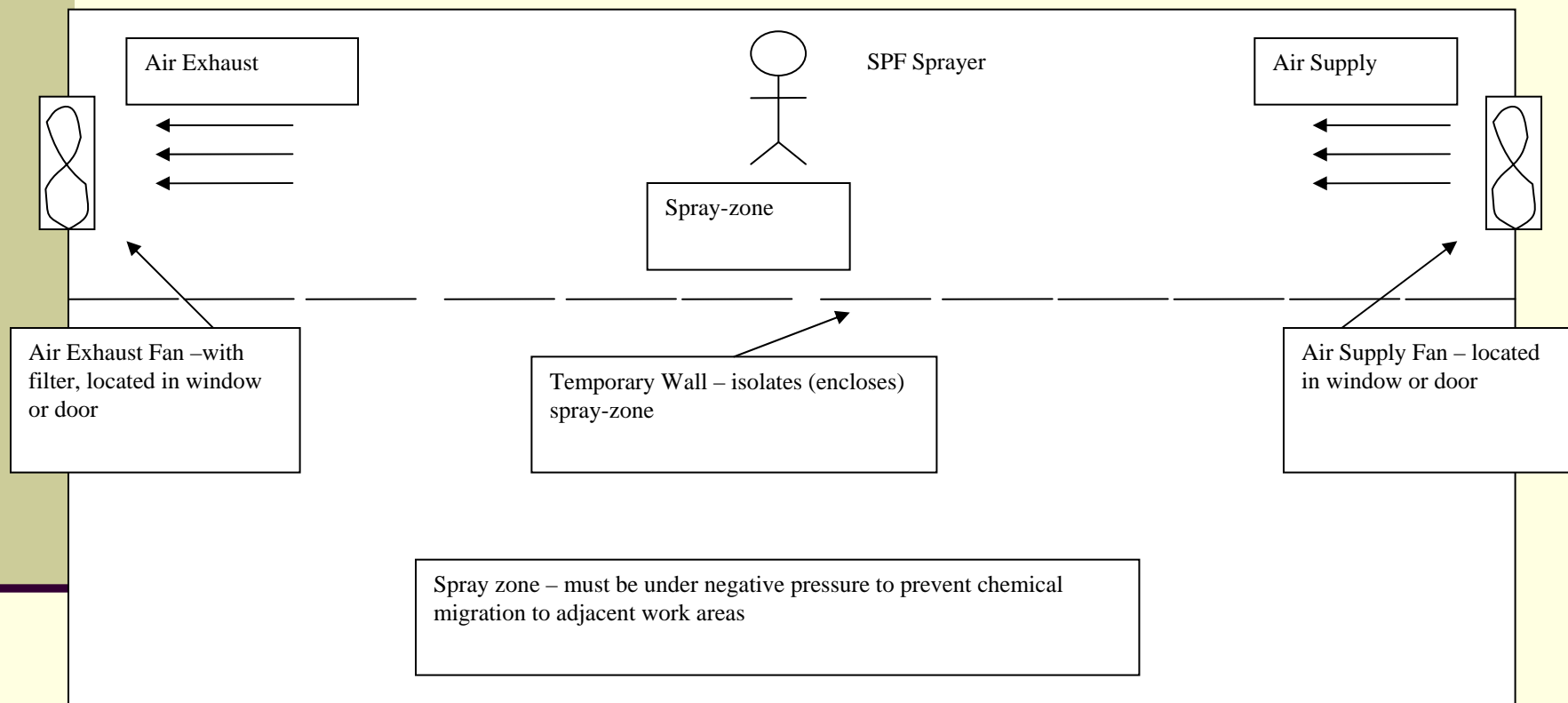


General Guidelines

- ✓ Enclose the spray zone as much as possible
- ✓ Supply air at one end of spray zone
- ✓ Direct airflow past spray zone
- ✓ Exhaust air at opposite end of spray zone
- ✓ Create negative pressure within the enclosure



Potential Schematic of Enclosure



Note: this proposed enclosure has not been tested.

Moving forward

- Government/industry partners working together to comprehensively address worker, homeowner, consumer exposures associated with SPF
- Practitioners need to be aware of potential hazards and solutions -- even for “green” products and technologies



Making Green Jobs Safe Workshop
Hosted By NIOSH
December 14 - 16, 2009
Washington, DC



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Assessing Health Risks in Consumer Products

Treye A. Thomas, Ph.D.
Office of Hazard Identification and Reduction
U.S. Consumer Product Safety Commission



The views expressed in this presentation are those of the CPSC staff, have not been reviewed or approved by, and may not necessarily reflect the views of the Commission.

Consumer Product Safety Commission

- Independent regulatory agency created in 1973.
- Mission: To protect the public from unreasonable risk of injury and death associated with consumer products.
- Jurisdiction includes thousands of different types of products sold to consumers for personal use in or around the household or school and in recreation.
 - Toys, electronic equipment, appliances, clothing/textiles, household cleaners/chemicals, and building materials

CPSC Regulatory Authority

- Consumer Product Safety Act (CPSA),
15 U.S.C. § 2051-2084
- Federal Hazardous Substances Act (FHSA), 15
U.S.C. § 1261-1278
 - CPSC regulates many chemical hazards
under the Federal Hazardous Substances Act
(FHSA) (15 U.S.C. §§ 1261-1278)
- Consumer Product Safety Improvement Act of
2008 (CPSIA)

Definitions of Toxicity

- Under the FHSA, the term "hazardous substance" is defined as:
“Any substance or mixture of substances which (i) is toxic, (ii) is corrosive, (iii) is an irritant, (iv) is a strong sensitizer, (v) is flammable or combustible, or (vi) generates pressure through decomposition, heat, or other means, if such substance or mixture of substances may cause substantial personal injury or substantial illness during or as a proximate result of any customary or reasonably foreseeable handling or use, including reasonably foreseeable ingestion by children.”

Federal Hazardous Substances Act

- Risk-based
 - Includes acute and chronic effects
 - Reliable human data preferred
 - Does not require pre-market approval
 - **Manufacturers ensure that their products are not hazardous & are properly labeled**
 - Hazardous children's products are banned
 - **Manufacturers must report "substantial product hazards" (CPSA)**
-

Risk Assessment Paradigm

- Hazard Identification
 - Is it toxic?
- Dose Response Assessment
 - How toxic is it?
 - What is the acceptable daily intake (ADI)?
- Exposure Assessment
 - How much contacts your body?
- Risk Characterization
 - Does the intake exceed the ADI?



Chronic Hazard Guidelines (CHG)

- In 1992, the Commission issued guidelines for assessing chronic hazards under the FHSA
 - Provides guidance on
 - Determining toxicity (e.g., carcinogenicity, neurotoxicity, bioavailability)
 - Acceptable Daily Intake (ADI)
 - Threshold for uptake into body
 - Assessing exposure
 - Risk assessment approaches and acceptable risk
 - Intended to assist manufacturers in complying with the FHSA
-

CPSC Options

- Labeling
- Product Recalls
- Product Bans
- Voluntary Standards
- Mandatory Standards
- Other





SPF Briefing Key Messages

Recap





Re-Cap

- SPF is an very effective insulator and sealant, so the industry needs to ensure that operations are carried out in a safe and healthful manner.
- SPF application presents the same hazards as spray-on truck bed liner (TBL) operations and requires the same level of protection (*similar hazards – similar remedies*)
- Product composition, applicator technique, temperature, and humidity are important factors that impact curing time and potential exposures.
- Challenge: Guidance is needed on ventilation, exposure controls, clean-up, and re-entry time.



Re-Cap

- Manufacturers need to ensure their products can be applied safely and are properly labeled.
- Employers need to communicate hazards, train workers, control exposures, and ensure all workers are adequately protected.
- Training needs to be widely available, integrate health and safety with performance, and updated.
- Communication and training is key to safe use and handling of SPF, and to prevent misleading marketing claims.
- Challenge: Best practices need to be developed, shared, and implemented to reduce exposures.



Re-Cap

- Challenge Ahead: Data that accurately assesses exposures with variable applications and product formulations:
 - Measuring total isocyanates.
 - Answering the question – When can occupants, residents, school children, and others re-enter the premises after SPF application?



SPF Public Activities

- Polyurethane 2009 Technical Conference, Maryland, October 6, 2009
- Series of Webinars for Federal Program Attendees
- GreenBuild Expo 2009 SPF Panel, Phoenix, Arizona, November 12, 2009
- Public Webinar, December 2, 2009
- “Making Green Jobs Safe Workshop”, (NIOSH) Washington, D.C., December 14-16, 2009
- SPFA Conference, Orlando, Florida, February, 2010
- AIHA Green Construction Practices - Integrating Occupational Safety and Health, Denver, Colorado, May, 2010 (tentative)
- GreenBuild Expo, November 2010 (tentative)



For Further Information

- EPA www.epa.gov/greenbuilding
- EPA Isocyanate Profile: <http://www.epa.gov/dfe/pubs/auto/profile/>
- EPA Integrated Risk Information System (IRIS) for MDI and pMDI can be found at <http://www.epa.gov/iris/subst/0529.htm>
- OSHA Website: www.osha.gov
 - <http://www.osha.gov/SLTC/isocyanates/index.htm>
- NIOSH Website: www.cdc.gov/NIOSH
 - <http://www.cdc.gov/niosh/topics/isocyanates/>
- Preventing Asthma and Death from Diisocyanate Exposure, NIOSH ALERT, DHHS Publication No. 96-111
 - <http://www.cdc.gov/niosh/asthma.html>
- NIOSH 800 Number: 1-800-CDC-INFO
- CPSC Website: www.cpsc.gov
 - CPSC Chronic Hazard Guidelines: <http://cpsc.gov/BUSINFO/chronic.pdf>
- ACC-CPI (Center for the Polyurethanes Industry) website—www.polyurethane.org – many publications on MDI and other isocyanates.
 - http://www.americanchemistry.com/s_api/SF_index.asp
- SPFA - <http://www.sprayfoam.org/>



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- Campo P, Wisnewski AV, Lummus Z et al. Diisocyanate conjugate and immunoassay characteristics influence detection of specific antibodies in HDI-exposed workers. *Clinical and Experimental Allergy* 2007;In Press.
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CPI-SPFA

Enhanced Spray Polyurethane Foam Product Stewardship Program

Kurt Riesenberg

Spray Polyurethane Foam Alliance



Overview

- Who is SPFA?
- Benefits of Spray Polyurethane Foam
- Enhanced Product Stewardship Program



Spray Polyurethane Foam Alliance

- Independent trade association for contractors, manufacturers and distributors of polyurethane foam, equipment, protective coatings, inspections, surface preparations and other services. Uniquely the entire supply-chain under one roof
- Maintains relationship with the American Chemistry Council's (ACC) Center for Polyurethanes Industry (CPI)
- Education and Research
- Promotion and Awareness



Residential Applications



courtesy Icynene



CATHEDRALIZED
CEILINGS

courtesy BASF



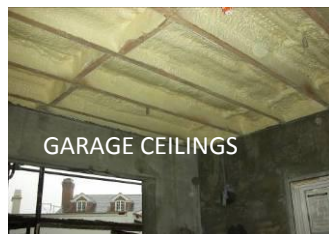
EXTERIOR WALLS

courtesy Honeywell/BSC



UNVENTED
CRAWLSPACES

courtesy Honeywell



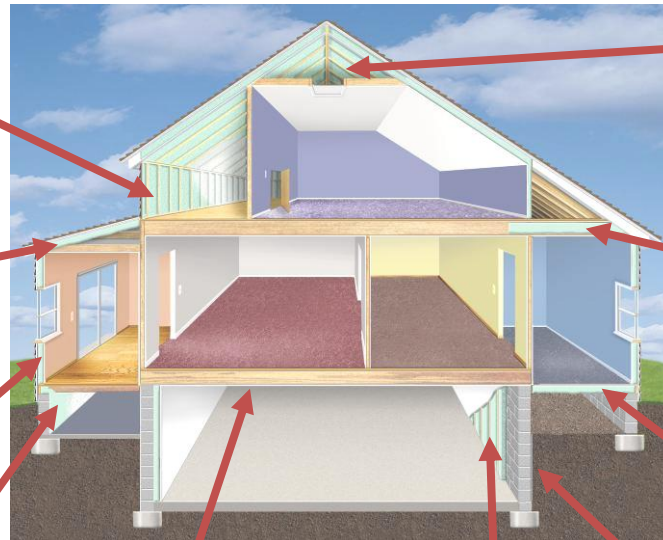
GARAGE CEILINGS

courtesy Honeywell



BASEMENT WALLS

courtesy Honeywell



courtesy NCF



UNVENTED ATTICS

courtesy Dow



ATTIC FLOORS

courtesy BASF



FLOORS

courtesy Honeywell



BELOW GRADE WALLS

courtesy BASF



American
Chemistry
Council™



Commercial Applications



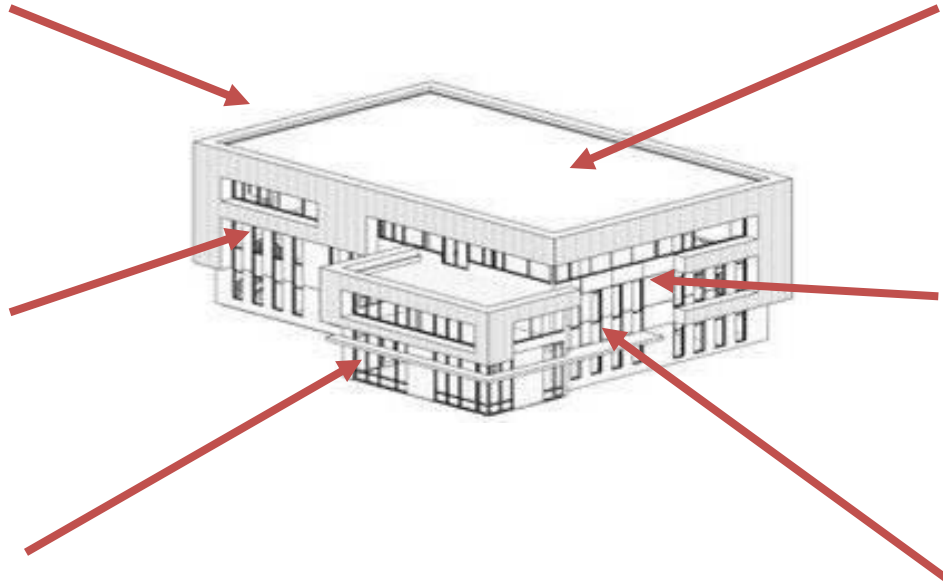
courtesy Honeywell/BSC



courtesy Demilec



courtesy Honeywell



courtesy BaySystems



courtesy Demilec



courtesy BASF



courtesy BASF



courtesy BaySystems



Benefits

- Energy savings of 30+%
 - Investment can typically be recovered in <5 years
 - Retards air transfer, minimizing air infiltration/exfiltration improving IAQ
 - Helps reduce HVAC capacity requirements
 - More thermal resistance with less material
 - One of the highest R-values/inch of all insulation materials, upwards of 6.0-6.5 per inch
- Structural Strength
- Reduced Deconstruction Waste (roofing)
- LEED Credits

Market Growth

- Total SPF market growth of 40+% since 2004
- Fastest-growing segment ('04 – '08):
 - Commercial Wall Insulation (+75%)
 - Residential Wall Insulation (+61%)
- This dramatic growth brings with it the need for increased outreach and communications on safe use and handling.

CPI-SPFA Enhanced Product Stewardship Program

- SPF can be used safely and effectively to insulate homes and buildings when handled correctly
- Launch of industry-led enhanced product stewardship program

Primary Goal

*To increase understanding of
safe installation practices regarding
use, handling and disposal of spray polyurethane foam*



Activities Through Summer '09

- Site Visits
 - Open cell & closed cell
 - Residential (new construction/renovation) & Commercial
 - Trimming, ventilation, dust and exposure techniques
- CPI-SPFA Workgroups
 - Leveraging the capabilities and networks of their respective member companies and other industry groups.
 - Working in tandem with the federal agencies to maximize impact and outreach.



SPF Health and Safety Website

www.spraypolyurethane.com

[CPI Home](#) | [SPFA](#) | [Contact Us](#) | [For Members](#)

spray polyurethane foam: health and safety

[spf home](#) | [polyurethane](#) | [health](#) | [protection](#) | [first-aid](#) | [regulations](#) | [marketing claims](#)

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center for the
polyurethanes industry

spray polyurethane
foam alliance



spray polyurethane foam

Welcome to the Spray Polyurethane Foam (SPF) Health and Safety site of the American Chemistry Council's Center for the Polyurethanes Industry (CPI) and the Spray Polyurethane Foam Alliance (SPFA). This site is intended for the spray polyurethane foam professional – from business owners, marketers, and sales representatives to applicators, helpers, and those working with spray polyurethane foam and its chemicals - to provide important product stewardship information about spray polyurethane foam insulation. It is also your source for the most recent developments in the SPF industry related to these issues. » [learn more](#)

latest news

CPI AND SPFA LAUNCH AN ENHANCED PRODUCT STEWARDSHIP PROGRAM TO SUPPORT INSTALLATION AND USE OF SPRAY POLYURETHANE FOAM

poster



Equipment Storage
This poster outlines good safety practices for spray polyurethane foam equipment storage.

latest publications



Polyurethane and Polyisocyanurate Foam: Six Steps for Fire Safety During Construction

A bulletin advising construction trades of precautions needed for performing 'hot work' around polyurethane and polyisocyanurate insulations.

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about cpi

The Center for the Polyurethanes Industry of the American Chemistry Council promotes the sustainable growth of the polyurethane industry, by identifying and managing issues that could impact the industry, in cooperation with user groups. Its members are U.S. producers or distributors of chemicals and equipment used to make polyurethane and manufacturers of polyurethane products.

» [learn more...](#)

about spfa

The Spray Polyurethane Foam Alliance is the voice and educational and technical resource for the spray polyurethane foam industry. SPFA staff and members provide a wide variety of services to the spray polyurethane foam industry to help educate and influence the construction industry on the benefits of spray polyurethane foam roofing, insulation, and climate control systems.

» [learn more...](#)

did you know?

Did you know that setting up a spill clean-up plan may help you quickly clean up product if a spill or leak occurs. Protecting people first, then minimizing environmental releases.

Launched
August 31, 2009

Selection of Product Stewardship

Guidance Materials

www.spraypolyurethane.com

- PPE
- Spill Containment
- Reading MSDS



Guidance Document

center for the polyurethanes industry / spray polyurethane foam alliance

Exterior Spray Polyurethane Foam Insulation Health & Safety Q&A

For Spray Foam Contractors

What are the general health hazards of SPF foam?

Information on occupational health & safety of SPF foam is available on the website www.spraypolyurethane.com. The MSDS for the product can be found on the website. The MSDS provides information on the health hazards of the product and the appropriate personal protective equipment (PPE) to be used when working with the product.

Guidance Document

center for the polyurethanes industry / spray polyurethane foam alliance

Hazard Communication for Spray Polyurethane Foam Insulation Applications

OSHA Standard 29 CFR 1910.1200
OSHA Standard 29 CFR 1910.1000

What are the general health hazards of SPF foam?

Information on occupational health & safety of SPF foam is available on the website www.spraypolyurethane.com. The MSDS for the product can be found on the website. The MSDS provides information on the health hazards of the product and the appropriate personal protective equipment (PPE) to be used when working with the product.

Guidance Document

center for the polyurethanes industry / spray polyurethane foam alliance

Exterior Applications Using Spray Polyurethane Foam Containing MDI/PMDI: Seven Important Points for Spray Polyurethane Foam Contractors

There are seven important points you will want to know about applying spray polyurethane foam (SPF) containing MDI/PMDI to exterior applications:

1. What is MDI?
2. What is PMDI?
3. Why are these products used in exterior applications?
4. What are the health hazards of MDI/PMDI?
5. How can you protect yourself from MDI/PMDI?
6. How can you protect others from MDI/PMDI?
7. How can you protect the environment from MDI/PMDI?

Guidance Document

center for the polyurethanes industry / spray polyurethane foam alliance

Interior Spray Polyurethane Foam Insulation Health & Safety Q&A

For Spray Foam Contractors

What are the general health hazards of SPF foam?

Information on occupational health & safety of SPF foam is available on the website www.spraypolyurethane.com. The MSDS for the product can be found on the website. The MSDS provides information on the health hazards of the product and the appropriate personal protective equipment (PPE) to be used when working with the product.

Guidance Document

center for the polyurethanes industry / spray polyurethane foam alliance

"Green" Marketing Claims and Spray Polyurethane Foam

SPF foam is a green product. It is made from renewable resources and it is non-toxic. It is also a green product because it is made from renewable resources and it is non-toxic. It is also a green product because it is made from renewable resources and it is non-toxic. It is also a green product because it is made from renewable resources and it is non-toxic.

Guidance Document

center for the polyurethanes industry / spray polyurethane foam alliance

Indoor Commercial and Residential Insulation Using Spray Polyurethane Foam Containing MDI/PMDI: Seven Important Points for Spray Polyurethane Foam Contractors

There are seven important points you will want to know about applying spray polyurethane foam (SPF) containing MDI/PMDI to indoor commercial and residential applications:

1. What is MDI?
2. What is PMDI?
3. Why are these products used in indoor applications?
4. What are the health hazards of MDI/PMDI?
5. How can you protect yourself from MDI/PMDI?
6. How can you protect others from MDI/PMDI?
7. How can you protect the environment from MDI/PMDI?

- Health & Safety Q/A
- Hazard Communication
- "Green" Marketing



Video: Safe Handling of MDI

links

MDI Video - Safe Handling of Diphenylmethane Diisocyanate Introduction

MDI Video - Part One - Hazard Communications

MDI Video - Part Two - Drum and Intermediate Bulk Container Handling

MDI Video - Part Three - Tank Container Transfers

MDI Video - Part Four - Cargo Tank Trailer Transfers

MDI Video - Part Five - Rail Tank Car Transfers

MDI Video - Part Six - Emergency Response

www.spraypolyurethane.com



Training Imperative

- Applicators – Opportunity to Influence
- Beyond Applicators
 - Message needs to be delivered in context
 - Know enough to ask the right questions
 - Consumers
 - Contractor Firm Managers
 - Construction / Design / Build Community
 - Broad Agency Staff
- Communication is key



Ongoing Outreach Activities

- CPI Conference (Oct '09)
 - Manufacturers
- Upcoming webinars on SPF safety
 - Agencies
 - SPFA/CPI
- SPFA Annual Convention – **GEAR-UP** Theme
 - Contractor audience
 - Agency briefings & topical breakouts
- Web resources
 - www.spraypolyurethane.com
 - www.sprayfoam.org
 - www.polyurethane.org
- Other prospective outreach



Message

- Safety is everyone's business – it all comes down to communication
- Project: Adoption Safety
 - Seek empowerment through knowledge
 - Training is essential
 - Know of, and use the safety resources available
- YOU have the ability to raise expectations and raise the bar on safety and performance

Thank You

**Kurt Riesenberg, Executive Director
Spray Polyurethane Foam Alliance
kurtriesenberg@sprayfoam.org**



CPI-SPFA

Spray Polyurethane Foam

Technical Discussion

Jim Chapman
Bayer MaterialScience LLC





Overview

- SPF Systems
- Cure and Re-Entry Times
- Existing Product Testing Capabilities
- Ventilation





SPF System Characteristics

- Basic Categories:
 - High-Pressure SPF systems
 - 2-component systems
 - Low-Pressure SPF systems
 - 2-component kits
 - 1-component foam products



SPF Delivery Systems

- Containers

- Refillable Cylinders:

- 2-component, Low-P only



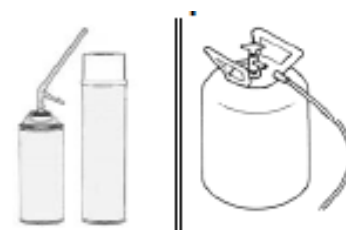
- Single-use Drums / Cylinders:

- 2-component only, High- & Low-P



- Pressurized Cans / Single-use cylinders:

- 1-component only





SPF Delivery Modes

- Spray
 - 2-component only, high & low pressure
 - Product application: insulation, coating

- Stream / Bead
 - 1-component & 2-component, low pressure only
 - Product application: adhesive, sealant



SPF Cure Timeline

<u>Time, sec</u>	<u>Observation</u>
0	System sprayed- temp 130 F
0.5	Cream time exothermic reaction beginning – physical blowing agent volatilizing
2	Gel time polymerization beginning
4	Tack free time surface of polymer solidified
360	Peak reaction exotherm achieved
900	Lesage <i>et al.</i> , 2007- detects no MDI on foam surface
14400	Reported cure time



Re-Entry Times

- Re-occupancy time dependent on numerous factors, such as:
 - SPF formulations
 - Amount of foam applied per volume of space
 - Degree of ventilation
- Certain components can be liberated from some newly-installed SPF products for a short period following installation.
- Evaluation reports for specific SPF products often include the product manufacturer' recommended re-occupancy time, which is variable.
 - 24 Hours is commonly suggested



Existing Product Testing Capabilities

- SPF products have been tested using the Canadian Standard Laboratory Guide for the Determination of Volatile Organic Compounds from Polyurethane Foam (CAN/ULC S774-06).
- Information is publicly available in some cases from The Canadian Construction Materials Centre which has a searchable database.
 - www.nrc-cnrc.gc.ca/eng/services/irc/ccmc/registry-product-evaluations.html
- Greenguard Environmental Institute testing program and Product Guide.
 - www.greenguard.org/Default.aspx?tabid=12



Ventilation Considerations

- Spraying Polyurethane Foam Insulation – Understanding the Hazards
 - Hazardous Chemicals
 - MDI hazards
 - Other Emissions
 - Potential Exposure Risks for Other Workers and Building Occupants
- Reducing Risks
 - During Application
 - Jobsite Communication
 - Safety Zone – Clearance from applicator
 - After Application
 - Post-application Ventilation
 - Re-occupancy Time
 - Odor Disclosure
 - Occupant Communication
- Ventilation Methods

Next Stage of CPI-SPFA Spray Polyurethane Foam Product Stewardship Program

Neeva-Gayle Candelori
ACC Center for the Polyurethanes Industry





Overview

- Who is CPI?
- Next Stage of Spray Polyurethane Foam Product Stewardship Program
- Summary





Who is CPI?

**CPI is part of the ACC,
the largest trade association
for the chemical industry,
and its Plastics Division,
the lead organization for
plastics resin producers**

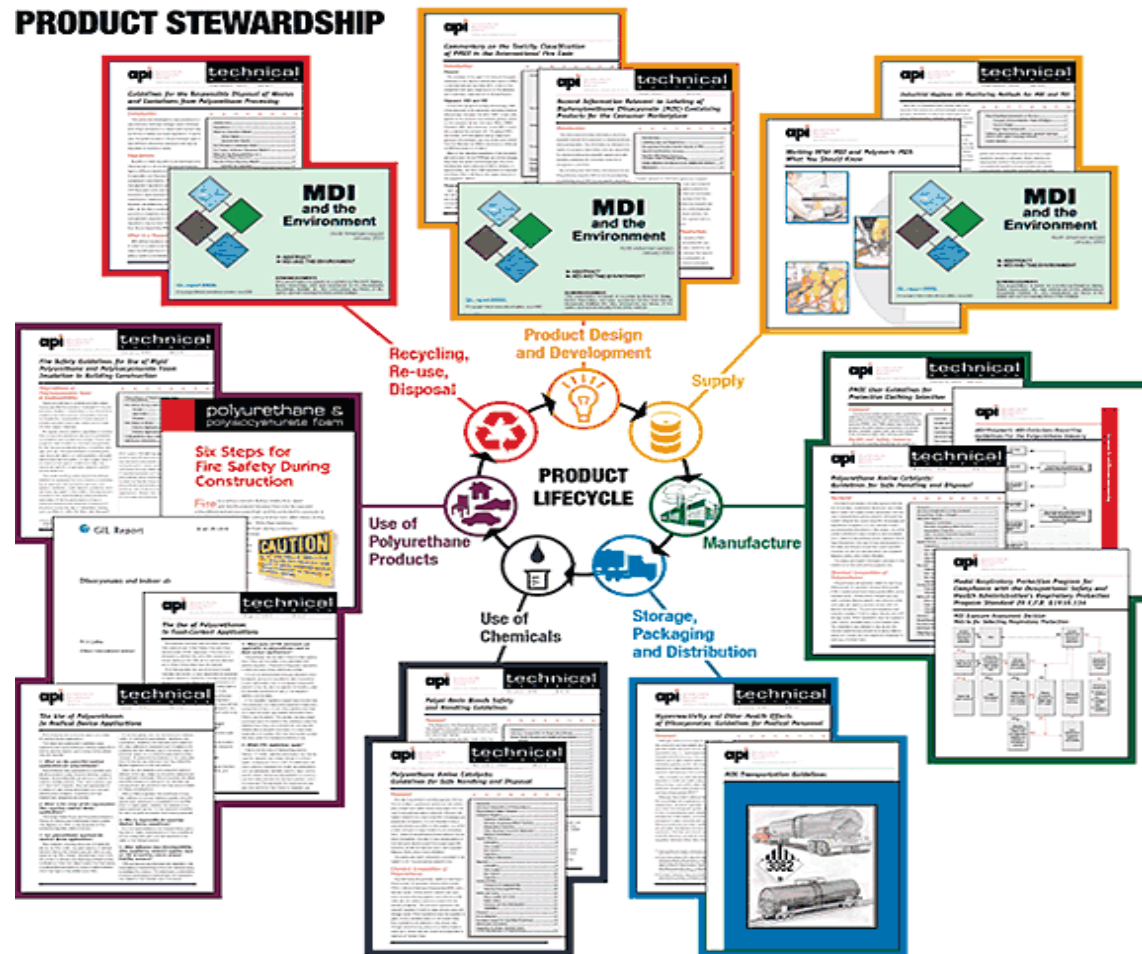


Product Stewardship History



- Guidance documents / videos
- Training programs
- RCAP
- Truck Bed Liners

PRODUCT STEWARDSHIP





Truck Bed Liner Program

- Multi-year project, included alliances with OSHA Regions IV, V, and VI.
- Alliances focused exclusively on use of MDI in spray-on truck bed liner applications.
- Resulted in extensive training programs and guidance materials.
 - Joint CPI/OSHA Training Seminars
 - Website
 - Guidance documents
 - Speaking engagements
 - Trade Shows
 - Video

TRUCK BED LINERS
WORKER PROTECTION

center for the polyurethanes industry

Safety Considerations for Application of Spray-On Truck Bed Liners

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ABSTRACT
Most polyurethanes or polyurea spray-on truck bed liners (TBL) products contain MDI, a diisocyanate which can cause irritation and allergic reactions in exposed workers. Occupational Safety and Health (OSHA) Region V, Chicago, Illinois, conducted an investigation in 2001 to determine if TBL workers were being exposed to MDI concentrations above the OSHA Permissible Exposure Limit (PEL) of 0.1 mg/m³. Five of the 15 operators employed at 12 sites were identified with MDI-related health effects. These workers were then interviewed and videotaped. In May 2001, Bennett et al. [1] published a study which outlined the results of this investigation in Washington State. They concluded that "The work-related asthma in the truck bed lining industry occurred and suggests a need for significant work site safety improvements, i.e., strict and enforced MDI exposure controls." In such an industry, conditions, exposure patterns, and incidents should be avoided, especially repetitive ones in well-known hot spots.

Directrizes para el Control de Exposiciones en la Industria de Revestimientos para Bases de Camionetas, para Aplicaciones con Sistemas de Alta Presión

NIOSH ALERT
Preventing Asthma and Death from MDI Exposure During Spray-on Truck Bed Liner and Related Applications

Got everything covered?
Keep yourself working safe by reading these helpful tips each day

before spraying

- To protect my lungs, wear a full-faced supplied-air respirator
- To help me see and to keep mask clean, use a peel-off shield
- To protect my skin, wear a full-bodied suit and chemical-resistant gloves
- To keep the ventilation system operating at its best, make sure the filters are clean

after spraying

- Remember to wash my hands and face before eating and drinking
- If I experience symptoms, such as shortness of breath or skin irritation, tell my supervisor and my doctor

AGREEMENT ESTABLISHING AN ALLIANCE
BETWEEN
THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
U.S. DEPARTMENT OF LABOR – OSHA REGION V
INDIANA DEPARTMENT OF LABOR
MICHIGAN DEPARTMENT OF LABOR
MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY
ILLINOIS ON-SITE CONSULTATION
OHIO ON-SITE CONSULTATION
WISCONSIN HEALTH ON-SITE CONSULTATION
AND
ALLIANCE FOR THE POLYURETHANES INDUSTRY

The Occupational Safety and Health Administration (OSHA), Indiana Department of Labor (IDL), Michigan Department of Labor (MDOL), Minnesota Department of Labor and Industry (MDLI), Illinois On-site Consultation Program, Ohio On-site Consultation Program, Wisconsin Health Consultation Program and the Alliance for the Polyurethanes Industry (API), a business unit of the American Plastics Council, recognize the value of establishing a collaborative relationship to foster safer and more healthful American workplaces. OSHA, IDOL, MDOL, MDLI, Illinois On-site, Ohio On-site Consultation, Wisconsin Health On-site Consultation and API hereby form an Alliance to provide API members and others in the spray-on truck bed liner industry with information, guidance, and access to training resources that will help them protect employees' health and safety, particularly in reducing and preventing exposures of diisocyanates during the application of spray-on truck bed liners. In developing this Alliance, OSHA, IDOL, MDOL, MDLI, Illinois On-site, Ohio On-site Consultation, Wisconsin Health On-site Consultation and API recognize that OSHA's State Plan and Consultation Project partners are an integral part of the OSHA national effort.

OSHA, IDOL, MDOL, MDLI, Illinois On-site, Ohio On-site Consultation, Wisconsin Health On-site Consultation and API will work together to achieve the following:

Next Stage of Program Highlights - Industry Professionals



- SPF health and safety training.
- Developing additional guidance related to reoccupancy, ventilation, personal protective equipment (PPE), and other workplace practices.
- Product research to support program direction.
- Creating a mechanism to better enable outreach, communications, and distribution of information.
- Launching baseline benchmarking of current practices/awareness.



Next Stage of Program Highlights - Industry Professionals *(cont.)*



- CPI-SPFA spray foam health and safety website to evolve with audience-tailored content: www.spraypolyurethane.com
- Develop new materials i.e. brochures, posters, videos for use on job sites.
- Enhance guidance for SPF green marketing claims.
- Expand media outreach via key trade journals.
- Participate and speak at key industry events (i.e. USGBC).
- Outreach to weatherization agents, architects, building and school superintendents, consumers, and other interested parties. (installing or having it installed)





Next Stage of Program Highlights - Do-It-Yourself Users

- Explore ways to enhance guidance at Point of Sale (POS)
 - one-component (spray in a can) and two-component low pressure SPF kits
- Increase accessibility of safety and handling information.
- Work with suppliers and distributors on DIY outreach i.e. SPF insulation workshops at “big box” retailers.



Summary

- Continued engagement with the federal agencies and other SPF stakeholders is critical to success.
- Will closely measure program impact and seek continuous feedback on improvement opportunities.
- Strong future ahead for SPF. An essential part of the solution in answering the call for improved energy efficiency nationwide.
- **We encourage everyone involved with SPF to become a product stewardship ambassador. We all can play a role.**

www.spraypolyurethane.com





Thank You

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