

# Isocyanates National Emphasis Program CPL 03-00-017



**Sven J. Rundman III**  
**Directorate of Enforcement**  
**Programs**  
**Office of Health Enforcement**

# Objectives

This presentation will enable attendees to:

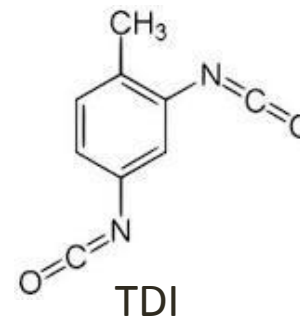
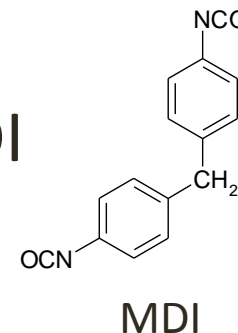
- Know signs/symptoms with routes of exposure to isocyanates.
- Understand site selection.
- Understand inspection procedures including various exposure assessments.
- Understand OSHA enforcement.
- Know available outreach efforts.

# Background

- OSHA develops National Emphasis Programs to focus inspections and outreach efforts on specific hazards in a workplace.
- Approved – June 20, 2013.
  - by Dr. Michaels, Assistant Secretary for OSHA
- First intended as an NEP on Asthmagens.
- Developed to focus OSHA resources on the workplace serious health effects associated with occupational exposure to isocyanates.
- Combines enforcement and outreach efforts to raise awareness to employers, workers, and safety and health professionals.

# Most Commonly Used

- Methyl isocyanate - MIC
- Methylene Bis (phenyl isocyanate) – MDI
- Toluene diisocyanate – TDI
- Hexamethylene diisocyanate – HDI
- Naphthalene diisocyanate – NDI
- Methylene bis-cyclohexylisocyanate – (HMDI)
- Isophorone diisocyanate - (IPDI)
- HDI biuret
- HDI isocyanurate



# Used in the Formation of Many Polyurethane Products

- Paint
- Blown foam insulation
  - Polyurethane foam
  - Insulation materials
    - Surface coatings
      - Car seats
      - Furniture
    - Foam mattresses
- Under-carpet padding
- Packaging materials
- Laminated fabrics
  - Adhesives



# Health Effects from Workplace Exposure

- Occupational asthma
- Dermatitis
  - Studies indicate that dermal exposure is a significant cause of respiratory sensitization.
- Irritation of mucus membranes
- Hypersensitivity pneumonitis
- Chest tightness
- Few are classified as potential human carcinogens (e.g., TDI – “reasonably anticipated” by NTP)

# Exposure Limits

- **OSHA Permissible Exposure Limits – MIC, MDI, TDI**
- Other Occupational Exposure Limits -NIOSH, ACGIH

Isocyanate CAS no. OSHA IMIS no.	Synonyms	Vapor Pressure	Occupational Exposure Limits (OEL)					
			OSHA PEL		NIOSH REL <sup>1</sup>		ACGIH TLV <sup>® 2</sup>	
			ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
Methyl isocyanate 624-83-9 1773	MIC; Isocyanatomethane	348 mmHg @ 68 °F	0.02 T	0.05 T	0.02 T	0.05 T	0.02 T	
Methylene bisphenyl isocyanate 101-68-8 1073	4,4-Diphenylmethane diisocyanate; MDI; 4,4-Diisocyanadiphenyl-methane; Methylene bis(4- phenylisocyanate); Methylene Bis(Phenyl Isocyanate)	0.000005 mmHg @ 77 °F	0.02 C	0.2 C	0.005 T 0.02 C	0.050 T 0.2 C	0.005 T	
Toluene-2,4- diisocyanate (TDI) 584-84-9 2470	2,4-Diisocyanato-1- methylbenzene; TDI; 2,4-TDI; 2,4-Toluene diisocyanate	0.01 mmHg @ 77 °F	0.02 C	0.14 C		4	0.005 <sup>5</sup> T 0.02 STEL	

# Program Procedures

- NEP applies to General Industry, Maritime, and Construction.
- NEP applies to ALL isocyanates
- Master targeting list for General Industry and Maritime.
- Area Offices are required to make three (3) inspections per year.
- NEP covers a three year period.



# Site Selection – GI/Maritime

- **Appendix A –**

- **Primary** targeting list compiled using NIOSH HHE evaluations, inspection sampling data (SLTC) – known overexposures, and available workers' compensation data.

SIC	SIC Title	NAICS	NAICS Title
2599	Furniture and Fixtures	339950	Sign Manufacturing
3442	Millwork/Metal Window and Door Manufacturing	332321	Wood or Metal Framed Windows and Door Mfg
3792	Travel Trailers and Campers	336214	Travel Trailer and Camper Mfg

- **Secondary** targeting list similar for settings known to use isocyanates but no documented overexposures.

# Site Selection - Construction

- Inspections are made whenever a complaint/referral is received; or a CSHO observes an activity where potential isocyanate exposures are suspected.
- Where potential exposure exists:
  - Document the status and condition of the work operation

SIC	SIC TITLE	NAICS 2007	NAICS TITLE
1721	Painting and Paper Hanging	238230	Painting and Wall Covering Contractors
1742	Plastering, Drywall, Acoustical, and Insulation Work	238310	Drywall and Insulation Contractors
1752	Floor Laying and Other Floor Work, NEC	238330	Flooring Contractors
1793	Glass and Glazing Work	238150	Glass and Glazing Contractors
1799	Special Trade Contractors, NEC	238150	Glass and Glazing Contractors

# Site Selection

- An area office has a broad flexible approach to the targeting list, similar to other NEPs.
- NEP maintains flexibility for an area office to use their judgment in adding sites based on local knowledge where exposure would be anticipated.
  - For example – SIC/NAICS 7500 – “Auto repair”
- If the establishment is not one of the listed establishments but the CSHO has verified that the facility is using Isocyanates, an inspection following the NEP should be initiated.

# Inspection Procedures

- Hazard Communication –
  - Check employer's chemical inventory list and SDSs to confirm that the employer is using Isocyanates.
    - Inspection may be discontinued if CSHO can verify no chemicals containing isocyanates used in a process/activity.
    - May need to make site walk-around and/or interview workers
  - Check for adequate training on hazards associated with isocyanates.
- Review OSHA 300 Injury and Illness logs for potential occupational illnesses due to isocyanate exposure.
- Check for effective respiratory protection program including fit-testing, medical evaluation, training, and respirator cleaning.

# Inspection Procedures

- Review employer's PPE hazard assessment.
- Evaluate the effectiveness of PPE during use of isocyanates:
  - Clothing – adequate to prevent contamination of employee's personal clothing or skin
  - Eye/Face – adequate to protect eyes and face from Isocyanate contact
  - Respiratory Protection - adequate to handle poor warning properties ( e.g. change schedule for APRs)
  - Chemical resistant gloves – (e.g. butyl, nitrile)
  - Information on PPE in Appendix G



# Inspection Procedures

- Health Surveillance Form (non-mandatory).
- Available to CSHO when interviewing worker.

## Appendix C (non-mandatory)

- Health Surveillance Form (Non-mandatory) – Isocyanate Exposure
- Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_
- Worker Name: \_\_\_\_\_
- 1. What was the month and year that you were hired at this company? \_\_\_\_\_
- 2. What is your job title? \_\_\_\_\_
- 3. Please describe your job duties: \_\_\_\_\_  
\_\_\_\_\_
- 4. How many hours per week do you work on average? \_\_\_\_\_
- 5. In what area or areas of the plant do you work? \_\_\_\_\_
- 6. Have there been any recent changes to your immediate work environment or processes in your worksite?  
\_\_\_ YES      \_\_\_ NO

# Inspection Procedures

- The CSHO will be prepared to take personal air samples on the first day of the inspection.
  - Follow sampling protocol which includes field extraction procedure.
- Wipe samples may be collected to determine surface, dermal, and/or PPE contamination.
  - Using direct-reading colorimetric wipes.



# Exposure assessments

- Wipe sampling
  - Surface
  - Dermal
  - PPE
- Expected and unexpected areas





# Exposure assessments

- **Expected**

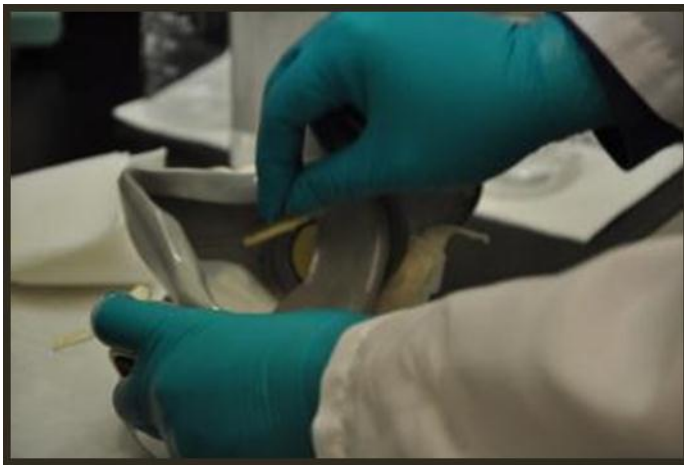
- Work benches
- Tool handles
- Cleaning areas
- Beverages in the workplace



# Exposure assessments

- Unexpected

- Drinking fountains
- Door knobs
- Locker rooms
- Keyboards
- Inside PPE



# OSHA Enforcement

Exposure	Issue Citation	Consider 5(a)(1) violation	Consider HAL
> PEL	✓		
No PEL, but > OEL,		✓	If 5(a)(1) not issued or elements not met
< PEL, but > OEL,		see FOM, Chapter 4, Section XIII.B.1.e	If 5(a)(1) not issued or elements not met
Reported illnesses/health effects (even if no overexposures have been documented)		✓ If serious illnesses/or health effects present and employer recognizes the hazard	If 5(a)(1) not issued or elements not met

**5(a)(1) elements:** (1) The employer failed to keep the workplace free of a hazard to which employees of that employer were exposed; (2) The hazard was recognized; (3) The hazard was causing or was likely to cause death or serious physical harm; and (4) There was a feasible and useful method to correct the hazard.

# Outreach

- Letters to stakeholders
- Speeches
- Isocyanates Safety & Health Topics page

**UNITED STATES DEPARTMENT OF LABOR**

SEARCH

A to Z Index | En español | Contact Us | FAQs | About OSHA

OSHA OSHA QuickTakes Newsletter RSS Feeds Print This Page Text Size Was this page helpful?

Occupational Safety & Health Administration **We Can Help** What's New | Offices

Home Workers Regulations Enforcement Data & Statistics Training Publications Newsroom Small Business OSHA

*back to* **SAFETY AND HEALTH TOPICS**

### Isocyanates

Isocyanates are compounds containing the isocyanate group (-NCO). They react with compounds containing alcohol (hydroxyl) groups to produce polyurethane polymers, which are components of polyurethane foams, thermoplastic elastomers, spandex fibers, and polyurethane paints. Isocyanates are the raw materials that make up all polyurethane products. Jobs that may involve exposure to isocyanates include painting, foam-blowing, and the manufacture of many Polyurethane products, such as chemicals, polyurethane foam, insulation materials, surface coatings, car seats, furniture, foam mattresses, under-carpet padding, packaging materials, shoes, laminated fabrics, polyurethane rubber, and adhesives, and during the thermal degradation of polyurethane products.



**Contents**

- [Home](#)
- [OSHA Standards](#)
- [Hazard Recognition](#)
- [Exposure Evaluation](#)
- [Possible Solutions](#)
- [Additional Information](#)

Page last reviewed: 03/26/2012

Health effects of isocyanate exposure include irritation of skin and mucous membranes, chest tightness, and difficult breathing. Isocyanates include compounds classified as potential human carcinogens and known to cause cancer in animals. The main effects of hazardous exposures are occupational asthma and other lung problems, as well as irritation of the eyes, nose, throat, and skin.

# Appendices

- **Appendix A** - Industries Where Isocyanate Exposures are Known or Likely to Occur
- **Appendix B** - Isocyanate Sampling, Field Extraction, and Sample Shipment Procedures
- **Appendix C** – Health Surveillance Form (Non-mandatory) – Isocyanate Exposure
- **Appendix D** – Sample Isocyanates Hazard Alert Letter
- **Appendix E** – Publications and Resources
- **Appendix F** – Sample General Duty Clause Citation Language
- **Appendix G** – General Guidance for Employers on Personal Protective Equipment(including respiratory protection) for Worker Exposures to Isocyanates
- **Appendix H** – General Guidance for Employers on Medical Surveillance Program Information for Worker Exposure to Isocyanates

# Summary

- Isocyanates causes many health effects including occupational asthma.
- NEP applies to General Industry, Maritime, and Construction.
- Targeting list built on NIOSH HHE evaluations, inspection sampling data (SLTC), and available workers' compensation data.
- Exposures can occur in expected and unexpected areas.
- Employer may be subject to citation if workers exposed above PEL or OEL where documented.
- Various compliance assistance material available.

# Questions?



Contact number – Office of Health Enforcement  
202-693-2190