Isocyanates National Emphasis Program
CPL 03-00-017

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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**

<table>
<thead>
<tr>
<th>Isocyanate CAS no.</th>
<th>OSHA IMIS no.</th>
<th>Synonyms</th>
<th>Vapor Pressure</th>
<th>OSHA PEL ppm</th>
<th>OSHA PEL mg/m³</th>
<th>NIOSH REL ppm</th>
<th>NIOSH REL mg/m³</th>
<th>ACGIH TLV® ppm</th>
<th>ACGIH TLV® mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl isocyanate</td>
<td>624-83-9</td>
<td>MIC; Isocyanatomethane</td>
<td>348 mmHg @ 68 °F</td>
<td>0.02 T</td>
<td>0.05 T</td>
<td>0.02 T</td>
<td>0.05 T</td>
<td>0.02 T</td>
<td></td>
</tr>
<tr>
<td>Methylene bisphenyl isocyanate</td>
<td>101-68-8</td>
<td>4,4-Diphenylmethane diisocyanate; MDI; 4,4-Diisocyanadiphenyl-methane; Methylene bis(4-phenylisocyanate); Methylene Bis(Phenyl Isocyanate)</td>
<td>0.000005 mmHg @ 77 °F</td>
<td>0.02 C</td>
<td>0.2 C</td>
<td>0.005 T</td>
<td>0.02 C</td>
<td>0.050 T</td>
<td>0.005 T</td>
</tr>
<tr>
<td>Toluene-2,4-diisocyanate (TDI)</td>
<td>584-84-9</td>
<td>2,4-Diisocyanato-1-methylbenzene; TDI; 2,4-TDI; 2,4-Toluene diisocyanate</td>
<td>0.01 mmHg @ 77 °F</td>
<td>0.02 C</td>
<td>0.14 C</td>
<td>4</td>
<td>0.0055 T</td>
<td>0.02 STEL</td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>SIC</th>
<th>SIC Title</th>
<th>NAICS</th>
<th>NAICS Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2599</td>
<td>Furniture and Fixtures</td>
<td>339950</td>
<td>Sign Manufacturing</td>
</tr>
<tr>
<td>3442</td>
<td>Millwork/Metal Window and Door Manufacturing</td>
<td>332321</td>
<td>Wood or Metal Framed Windows and Door Mfg</td>
</tr>
<tr>
<td>3792</td>
<td>Travel Trailers and Campers</td>
<td>336214</td>
<td>Travel Trailer and Camper Mfg</td>
</tr>
</tbody>
</table>

- **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

<table>
<thead>
<tr>
<th>SIC</th>
<th>SIC TITLE</th>
<th>NAICS 2007</th>
<th>NAICS TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1721</td>
<td>Painting and Paper Hanging</td>
<td>238230</td>
<td>Painting and Wall Covering Contractors</td>
</tr>
<tr>
<td>1742</td>
<td>Plastering, Drywall, Acoustical, and Insulation Work</td>
<td>238310</td>
<td>Drywall and Insulation Contractors</td>
</tr>
<tr>
<td>1752</td>
<td>Floor Laying and Other Floor Work, NEC</td>
<td>238330</td>
<td>Flooring Contractors</td>
</tr>
<tr>
<td>1793</td>
<td>Glass and Glazing Work</td>
<td>238150</td>
<td>Glass and Glazing Contractors</td>
</tr>
<tr>
<td>1799</td>
<td>Special Trade Contractors, NEC</td>
<td>238150</td>
<td>Glass and Glazing Contractors</td>
</tr>
</tbody>
</table>
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

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

**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

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