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OSH Division

- ***Exposures to Health Hazards Special Emphasis Program***

Objectives

- Recite the exposures relevant to the Health Hazards Special Emphasis Program
- Recognize where exposures to these targeted chemicals occur and important conditions impacting their hazards
- Know how to evaluate SEP Health Hazards during your inspections
  - Make referrals as needed

Health Hazards SEP – OPN 135

- **Purpose**
  - Target more high hazard industries
  - Reduce the number of occupational exposures to lead, silica, asbestos, isocyanates, and hexavalent chromium

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Health Hazards SEP – OPN 135

- **Fiscal Year 2005**
  - Health Hazards SEP implemented
    - » Styrene, asbestos, lead, isocyanates, and silica
  - Goal of 200 compliance inspections
  - Referral and complaint inspections conducted

- **Fiscal Year 2009**
  - OPN 135 revised
  - Styrene dropped and hexavalent chromium added
  - Goal of 200 compliance inspections
  - Health hazards training included in General Industry and Construction 10-hour courses
- **Fiscal Year 2014**
  - Added un-regulated substances without a PEL (ex. 1-bromopropane)
  - Added follow-up inspections for exposures above the PEL

OPN 135- Appendix A – NAICS examples

OPN 135F, cont'd.

Appendix A: Industry Type and NAICS Tables

Lead Inspections

NAICS	*Industry Type*
237310	Highway, Street, and Bridge Construction
237990	Other Heavy and Civil Engineering Construction
237110	Water and Sewer Line and Related Structures Construction
236210	Industrial Building Construction
238320	Painting and Wall Covering Contractors
238120	Structural Steel and Precast Concrete Contractors
237130	Power and Communication Line and Related Structures Construction
238910	Site Preparation Contractors
238150	Glass and Glazing Contractors
325182	Carbon Black Manufacturing
325131	Inorganic Dye and Pigment Manufacturing
325510	Paint and Coating Manufacturing
325320	Pesticide and Other Agricultural Chemical Manufacturing
327211	Flat Glass Manufacturing

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OPN 135- Appendix A – NAICS examples

OPN 135F, cont'd.

Silica Inspections

NAICS	*Industry Type*
237310	Highway, Street, and Bridge Construction
237990	Other Heavy and Civil Engineering Construction
236210	Industrial Building Construction
237130	Power and Communication Line and Related Structures Construction
237110	Water and Sewer Line and Related Structures Construction
238190	Other Foundation, Structure, and Building Exterior Contractors
238910	Site Preparation Contractors
327123	Other Structural Clay Product Manufacturing
327124	Clay Refractory Manufacturing
327332	Concrete Pipe Manufacturing
327390	Other Concrete Product Manufacturing
327320	Ready-Mix Concrete Manufacturing
327991	Cut Stone and Stone Product Manufacturing
327910	Abrasive Product Manufacturing
212325	Clay and Ceramic and Refractory Minerals Mining

OPN 135- Appendix A – NAICS examples

Hexavalent Chromium Inspections

NAICS	*Industry Type*
316110	Leather and Hide Tanning and Finishing
325131	Inorganic Dye and Pigment Manufacturing
325188	Industrial Inorganic Chemicals, NOC.
325211	Plastics Materials and Resin Manufacturing
325510	Truck Trailer Manufacturing
327125	Non-clay Refractory Manufacturing
327213	Glass Container Manufacturing
331111	Iron and Steel Mills
331112	Electrometallurgical Ferroalloy Product Manufacturing
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except copper and aluminum)
331510	Ferrous Metal Foundries
332111	Iron and Steel Forging

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OPN 135- Appendix A – NAICS examples

OPN 135F, cont'd.

Asbestos Inspections

NAICS	*Industry Type*
562910	Remediation Services
336340	Motor Vehicle Brake System Manufacturing
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing

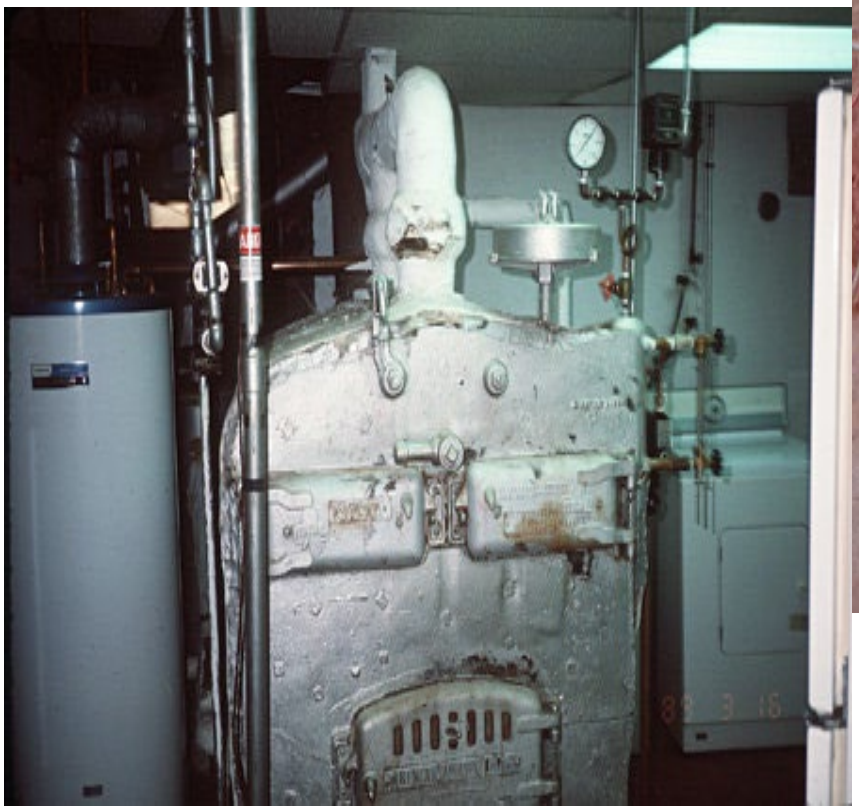
Isocyanate Inspections

NAICS	*Industry Type*
221119	Other Electric Power Generation
221210	Natural Gas Distribution
238210	Electrical Contractors
238310	*Drywall and Insulation Contractors*
238330	Flooring Contractors
314992	Tire Cord & Tire Fabric Mills
321219	Reconstituted Wood product mfg.
321911	Wood Window and Door Mfg.
323112	Commercial Flexographic Printing
325212	Synthetic Rubber Manufacturing
325510	Paint & Coating Mfg.

Compliance Inspections

- Can you recognize lead, silica, hexavalent chromium, isocyanates, and asbestos exposures during your inspections?
- Are you prepared if those employees are involved in lead, silica or asbestos related activities?
- Are you prepared if those employees are involved in isocyanates or hexavalent chromium related activities?

Compliance Inspections



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Compliance Inspections

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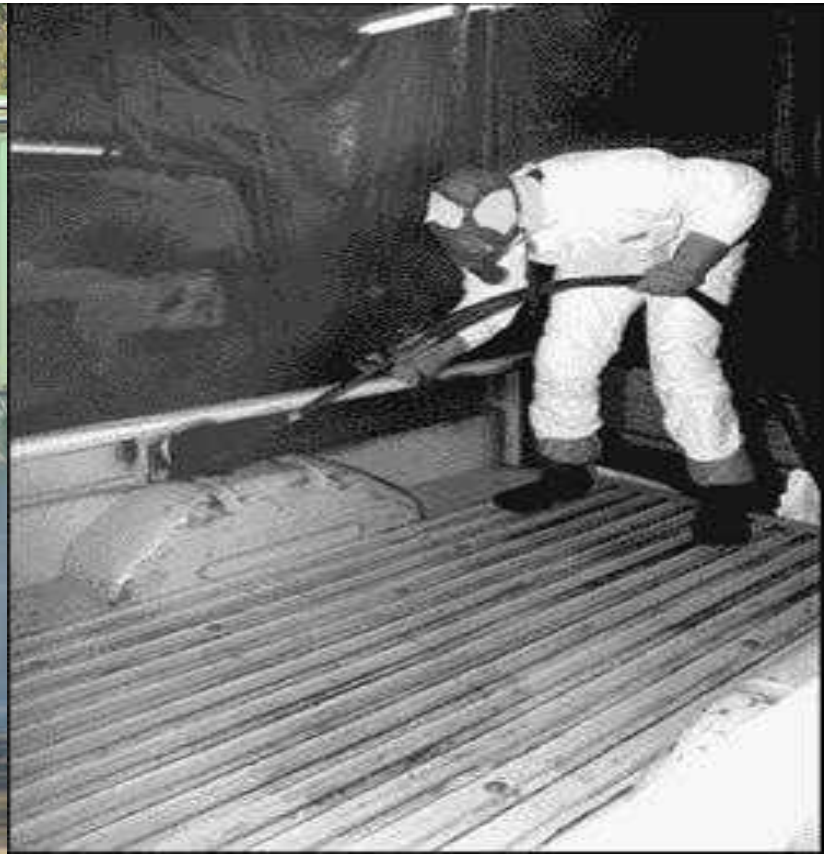
Compliance Inspections



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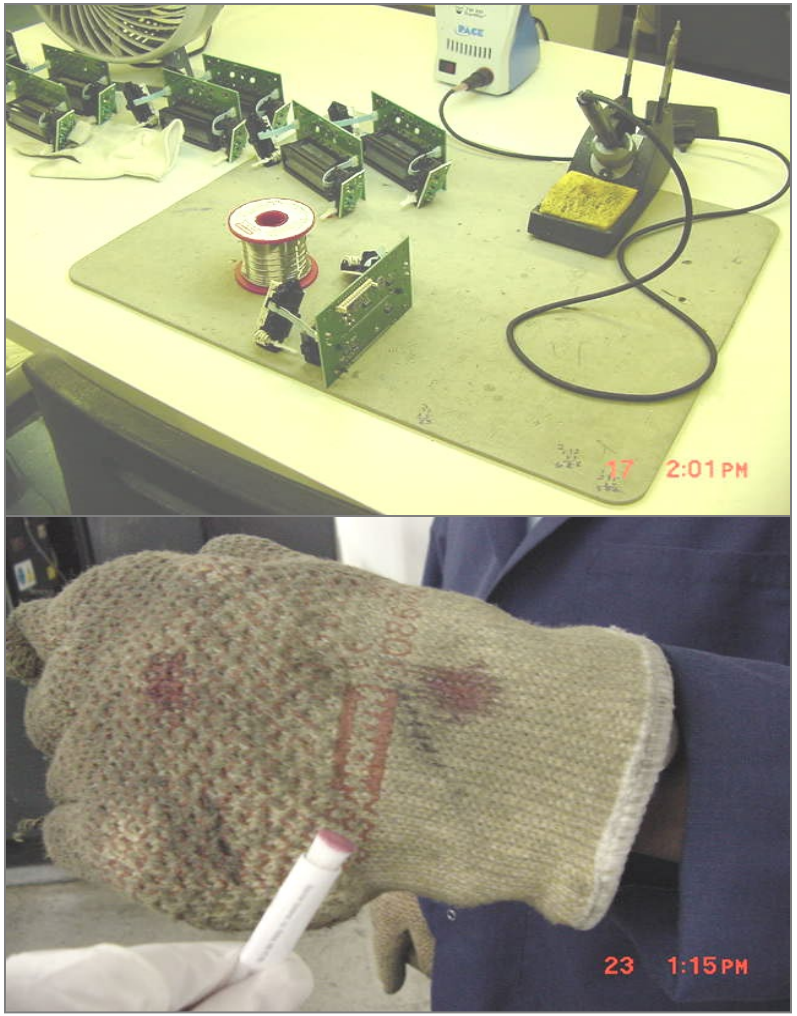
Lead Exposures

- Cutting, welding, grinding, abrasive blasting
- Lead paint removal
- Foundries
- Manufacturing of ammunition
- Firearm ranges
- Electronics



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Lead Evaluation and Control

- Routes of Exposure
- Associated Illnesses
- PELs
- General Industry Standard
- Construction Industry Standard
- Sampling Media
- Analysis
- Respiratory Protection

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Lead Standard

1910.1025
1926.62

- Means metallic lead, all inorganic lead compounds, and organic lead soaps
  - Excluded from this definition are all other organic lead compounds

Lead Health Effects

1910.1025, Appendix A
1926.62, Appendix A

- **Acute effects:** Show up sooner usually after high exposure
  - Symptoms can include metallic taste, stomach pain, vomiting, diarrhea and black stools which could potentially cause intoxication, coma, respiratory arrest, or death
  - Short term occupational exposures of this magnitude are highly unusual, but not impossible

Lead Health Effects

1910.1025, Appendix A
1926.62, Appendix A

- **Chronic effects:** Take longer to develop and often are attributed to lower cumulative exposures over time
  - Symptoms can include tiredness, weakness, weight loss, insomnia, headache, nervous irritability, fine tremors, numbness, dizziness, anxiety and hyperactivity which could potentially lead to:
    - *Damage of the nervous system and brain*
    - *Anemia*
    - *Kidney disease*

Lead Exposure Limits

1910.1025
1926.62

- Permissible exposure limit (PEL) = 50 µg/m³ as an 8 hour time-weighted average (TWA)
  - Employers shall implement engineering controls and safe work practices to prevent exposure
  - Employers shall provide protective clothing and where necessary, and respiratory protection in accordance with 29 CFR 1910.134
- Action level (AL) = 30 µg/m³ as an 8 hour TWA

Medical Surveillance

1910.1025
1926.62

- In **General Industry**, employer shall institute a medical surveillance program for employees who are or may be exposed above the action level for more than 30 days per year
  - Appendix C - Medical Surveillance Guidelines
- In **Construction**, employer shall provide *initial* medical surveillance for any employee exposed at or above the action level for any one day

Silica Exposures

- Abrasive blasting
- Manufacture of glass and pottery
- Crushing, loading, hauling, chipping, hammering, drilling, and dumping of rock or concrete
- Masonry work
- Cutting concrete siding
- Manufacturing concrete products

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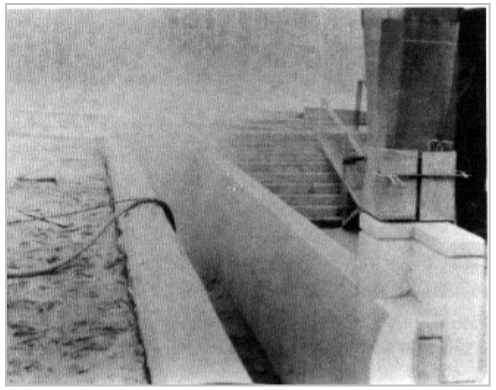
Silica Evaluation and Control

- Routes of Exposure
- Associated Illnesses
- PELs
- General Industry Standard
- Construction Industry Standard
- Sampling Media
- Analysis
- Respiratory Protection



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Health Effects

1910.1053
1926.1153

- Occupational exposure to respirable crystalline silica is associated with the development of silicosis, lung cancer, pulmonary tuberculosis, and airway diseases
  - Exposures may also be related to the development of autoimmune disorders, chronic renal disease, and other adverse health effects

Silica Exposure Limits

1910.1053
1926.1153

- AL = 25 µg/m³ as an 8-hour TWA
  - Written Exposure Control Plan (ECP)
- PEL = 50 µg/m³ as an 8-hour TWA
  - Employers must use engineering controls to prevent or reduce exposure
  - Respiratory protection is required when exposure remains above PEL after engineering controls are utilized or when required by Table 1

Medical Surveillance

1910.1053
1926.1153

- At no cost to the employee
- At a reasonable time and place
- **General Industry**
  - When exposed at or above 25 µg/m^3 for 30 or more days for any 12 consecutive months
- **Construction**
  - When employee is required to wear a respirator 30 or more days for any 12 consecutive months

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EXIT
DANGER
DANGER

Granite counter tops


DEC 5 2003


DEC 8 2003

Asbestos

1910.1001
1926.1101

- Name given to a group of naturally occurring fibrous silicate minerals mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength
- Used in building materials for resistance against heat and corrosion
- Asbestos includes:
  - Chrysotile
  - Crocidolite
  - Anthophyllite
  - Amosite
  - Tremolite
  - Actinolite

Asbestos Exposures

- Class I work
  - Class II work
    - » Class III
      - Class IV
- Brakes

Asbestos Evaluation and Control

- Routes of Exposure
- Associated Illnesses
- PELs
- General Industry Standard
- Construction Industry Standard
- Sampling Media
- Analysis
- Respiratory Protection

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Asbestos

1910.1001
1926.1101

- Airborne fibers range from 5 µm or greater, with a length-to-diameter ratio of at least 3 to 1
- **ACM:** "Asbestos-containing material," any material containing >1% asbestos
- **PACM:** "Presumed asbestos-containing material" – thermal system insulation and surfacing material found in buildings constructed no later than 1980

Asbestos Health Effects

1910.1001
1926.1101

- **Asbestosis:** A serious, progressive, long-term non-cancer disease of the lungs

- **Lung Cancer:** Causes the largest number of deaths related to asbestos exposure
  - Most common symptoms of lung cancer are coughing and a change in breathing

- **Mesothelioma:** A rare form of cancer found in the thin lining (membrane) of the lung, chest, abdomen, and heart
  - Most cases are linked to asbestos exposures

Exposure Limits

1910.1001
1926.1101

- Permissible exposure limit
  - 0.1 fiber per cubic centimeter (f/cc) of air as an 8 hour TWA
- Excursion limit
  - Not more than 1 f/cc averaged over 30 minutes
- Monitoring
  - Initially for workers who are or may be exposed at or above the PEL and/or above the excursion limit
  - Periodic if above PEL or excursion limit

Responsibility

1910.1001
1926.1101

- Building/facility owner
- Removal/abatement of asbestos is covered by 29 CFR 1926 (Construction)
- Must adhere to:
  - Multi-employer worksite
    - » *Hazards abated by contractor who created*
    - » *Inform others of measures to control exposures*
    - » *Adjacent employer will check containment*
    - » *General contractor (GC) requires compliance*
  - Competent person

Medical Surveillance

1910.1001
1926.1101

- Required when above PEL/excursion limit
  - Pre-placement examinations
    - *Medical/work history*
    - *Complete physical exam with emphasis on respiratory system, cardiovascular system and digestive tract*
    - *Completion of questionnaire – Appendix D*
    - *Chest X-Ray (Roentgenogram)*
    - *Pulmonary function test (PFT)*
    - *Any additional tests required by the Physician or other Licensed Healthcare Professional (PLHCP)*
  - Periodic exam (annually)
  - Upon termination of employment (1910)

Respirator Selection

1910.1001
1926.1101

- When is respiratory protection required?
  - Above PEL
  - Based on **Class** of work performed

- Provided in accordance with 29 CFR 1910.134 (b) - (d) (except (d)(1)(iii)), and (f) - (m)
  - Proper selection per 29 CFR 1910 or 29 CFR 1926
  - High efficiency particulate air (HEPA) filters for all air purifying respirators (APR)
  - No filtering face pieces (dust masks)

Hexavalent Chromium Exposures

- Hot work such as welding on stainless steel
- Industrial uses in dyes, paints, inks, plastics

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Affected Operations

1910.1026
1926.1126

- Electroplating
- Welding on stainless steel or Cr(VI) painted surfaces
- Painting
  - » Aerospace
  - » Auto body repair
- Chromate pigment and chemical production
- Chromium dye and catalyst production
- Glass manufacturing
- Plastic colorant production
- Construction
- Refractory brick restoration
- Paint removal from bridges
- Traffic painting

Hexavalent Chromium Evaluation and Control

- Routes of Exposure
- Associated Illnesses
- PELs
- General Industry Standard
- Construction Industry Standard
- Sampling Media
- Analysis
- Respiratory Protection

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Hexavalent Chromium

1910.1026
1926.1126

- Toxic form of chromium metal that is generally man-made
- Used in many industrial applications primarily for its anti-corrosive properties
- Can be created during certain “hot work” processes where the original form of chromium was not hexavalent

Health Effects

1910.1026
1926.1126

- Lung cancer in workers who breathe airborne hexavalent chromium
- Irritation or damage to the nose, throat, and lung (respiratory tract) if hexavalent chromium breathed at high levels
- Irritation or damage to the eyes and skin if hexavalent chromium contacts these organs in high concentrations

Exposure Limits

1910.1026
1926.1126

- Permissible exposure limit
  - 5 µg/m^3, calculated as an 8-hour time-weighted average
- Action level
  - 2.5 µg/m^3
- Exposure determination
  - See paragraph (d) for more specifics

Monitoring

1910.1026
1926.1126

- Scheduled
  - Initial monitoring indicates exposures are:
    - *Below the AL: monitoring can be discontinued*
    - *At or above the AL: monitor every 6 months*
    - *Above the PEL: monitor every 3 months*
  - Periodic personal monitoring

- Performance-oriented option
  - To determine 8-hour TWA for each employee based on any combination of the following:
    - *Air-monitoring data*
    - *Historical monitoring data*
    - *Objective data*

Regulated Areas

1910.1026(e)

- **General Industry** employers only
  - Areas where exposures exceed or can be reasonably expected to exceed the PEL
    - » *Must be demarcated from other areas*
    - » *Must limit access to employees who have a need to be there*

Medical Surveillance

1910.1026
1926.1126

- Occupationally exposed for 30 days or more at or above the AL or employees who are showing signs/symptoms of exposure
- Conducted within 30 days after initial assignment
- Annually
- Within 30 days after PLHCP written medical opinion
- Employee shows signs and symptoms of adverse health effects
- Within 30 days after exposure of uncontrolled release
- Termination of employee

Isocyanate Exposures

- **Polyurethane polymers**
- **Surface coating**
  - Automotive industry
  - Spray-on bed liners
- **Manufacturing**
  - Foam mattresses
  - Under carpet padding
  - Insulation materials
  - Packaging materials
- **Foam blowing**
  - Extrusion operations

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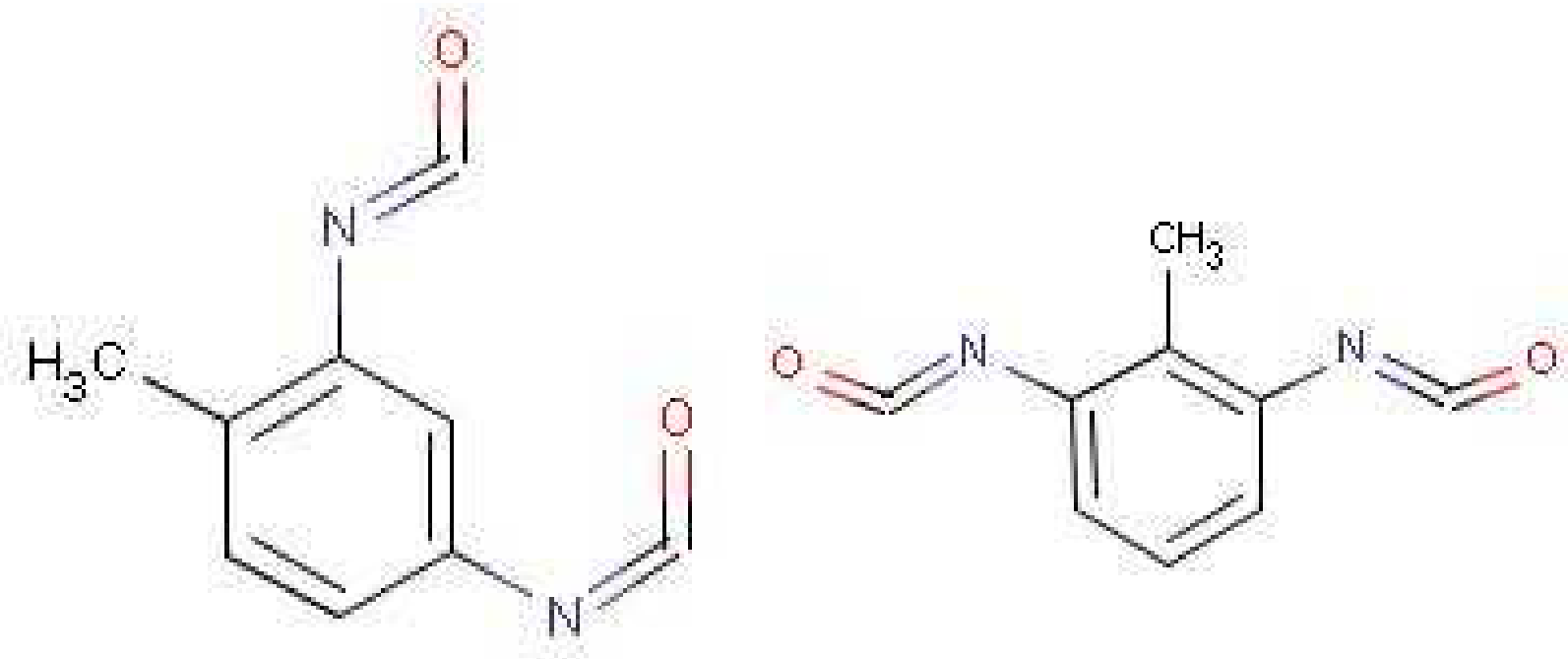
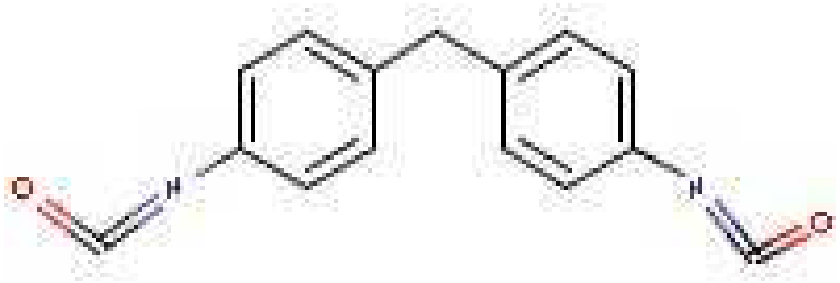
Isocyanate PELs & IDLH

- Methyl isocyanate
  - PEL= 0.02 ppm
  - IDLH= 3 ppm
- Methylene bisphenyl isocyanate
  - PEL= 0.02 ppm (Ceiling)
  - IDLH= 75 mg/m3 or 7.32 ppm
- Toluene-2, 4-diisocyanate
  - PEL= 0.02 ppm (Ceiling)
  - IDLH= 2.5 ppm

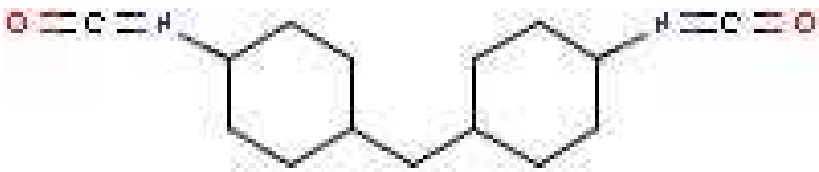
Toluene Diisocyanate (TDI)



MDI and HMDI

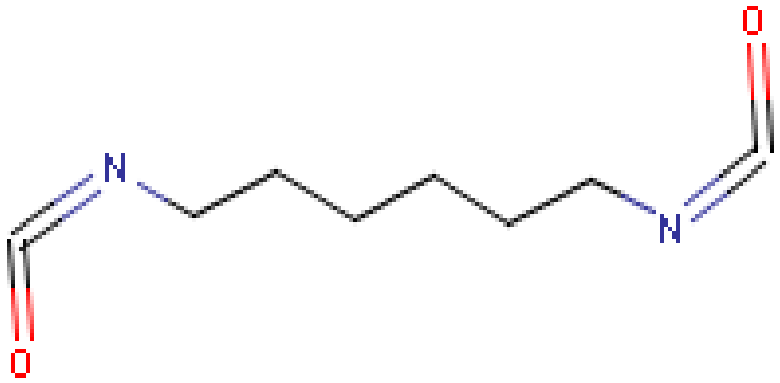


Methylene diphenyl diisocyanate

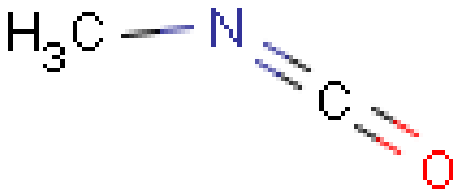


Hydrogenated methylene diphenyl diisocyanate

HDI and MIC



1,6-Hexamethylene diisocyanate



Methyl isocyanate

Medical Surveillance

1910.1000
1926.55

- It is recommended that workers exposed to isocyanates at or above the PEL or TLV undergo annual medical examinations and health surveillance under the supervision of a PLHCP
- Physical examination should detail the workers demographic and occupational history
- A pulmonary function test (spirometry) is recommended as well as a blood sample to monitor the systemic effects

Notes

- 2,4-Toluene diisocyanate is primarily used as a chemical intermediate in the production of polyurenthane products.
  - 2,4-Toluene diisocyanate is extremely toxic from acute (short-term) and chronic (long-term) exposures. Acute exposure in humans, via inhalation, results in severe irritation of the skin and eyes and affects the respiratory, gastrointestinal, and central nervous systems (CNS). Chronic inhalation in humans has resulted in significant decreases in lung function in workers, an asthma-like reaction characterized by wheezing, dyspnea, and bronchial constriction.
  - *Animal studies have reported significantly increased incidences of tumors of the pancreas, liver, and mammary glands from exposure to 2,4-toluene diisocyanate via gavage (experimentally placing the chemical in the stomach). The International Agency for Research on Cancer (IARC) has classified 2,4-toluene diisocyanate as a Group 2B, possible human carcinogen.*

- SOURCE: EPA's website http://www.epa.gov/ttn/atw/hlthef/toluene2.html

Notes

Respiratory Sensitization

- Isocyanates can sensitize workers, making them subject to severe asthma attacks if they are exposed again, even when concentrations are continuously below the NIOSH REL [NIOSH 1973, 1978; Banks 1998].

- Skin exposures may be associated with the onset of respiratory symptoms [Petsonk et al. 2000]. Respiratory disorders associated with isocyanate exposure include asthma and hypersensitivity pneumonitis [Baur et al. 1984; Baur 1995].

- Sensitization may result from a single episode of overexposure or intermittent exposures at low concentrations. Once a worker is sensitized, even low concentrations may trigger symptoms such as wheezing, chest tightness, shortness of breath, and cough. Persons with chronic hypersensitivity pneumonitis may also experience fatigue and weight loss. These symptoms may begin immediately or may be delayed for up to 8 hours after exposure. Death from severe asthma in sensitized subjects has been reported [Fabbri et al. 1988; MIFACE 2003].

SOURCE: NIOSH website: http://www.cdc.gov/niosh/docs/2006-149/#3

Notes

Bhopal India
December 3-4, 1984

- Shortly after midnight, methyl isocyanate (MIC) gas leaks from a tank at the UCIL Bhopal plant. According to the state government of Madhya Pradesh, approximately 3,800 people die and several thousand other individuals experience permanent and partial disabilities.
- UCC Technical team reports that a large volume of water was introduced into the MIC tank and triggered a reaction that resulted in the gas release. Independently, a committee of experts for the Indian government arrives at the same conclusion

Source: Bhopal Information Center (Union Carbide) website http://www.bhopal.com/chronology

Inspection Expectations

- **General Industry Programmed Inspections**
  - Randomly chosen from data base
  - Comprehensive health inspections
  - Potentially joint health and safety

- **Unprogrammed Inspections**
  - Fatalities, accidents, referrals, and complaints
  - Limited in scope

Health Hazards SEP Referrals

- **CSHO Referrals**
  - All compliance personnel will be instructed to look for lead, silica, hexavalent chromium, isocyanates, and asbestos activities

- **DHHS Referrals**
  - Asbestos removal jobs projected to last 15 days or longer
  - Workers having blood lead levels above 25ug/100 grams of whole blood

Inspection Expectations

- All aspects of lead, silica, exavalent chromium, isocyanates, and asbestos related work will be evaluated.
  - Air monitoring and wipe samples
  - Dermal exposure surveys
  - Hazard communication
  - PPE hazard assessments
  - Respiratory protection
  - Medical monitoring
  - Recordkeeping
  - Relevant training documentation

Summary

- Exposures relevant to the Health Hazards Special Emphasis Program
- Recognize where exposures to these targeted chemicals occur and important conditions impacting their hazards
- Evaluating SEP Health Hazards during your inspections

Thank You For Attending!

Final Questions?

1-800-NC-LABOR

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