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MIOSHA Hazard Alert

Spray-on Truck-bed Liner Operation Proves Fatal

Fatality Summary

This year the MIOSHA program investigated a fatality related to the spraying of truck-bed liners. The spray-on truck-bed liner product contained a very toxic chemical, methylene bisphenyl isocyanate (MDI). This alert provides information on isocyanate use, the hazards associated with isocyanates, steps to take to protect yourself, and contact information for the MIOSHA Consultation Education & Training (CET) Division, which provides free assistance to employers in the State of Michigan.

The fatality occurred at a small auto and truck accessory and detailing shop that purchased the franchise rights to apply the spray-on truck-bed liner product. The individual spraying the product had a previous acute exposure to the MDI and had become sensitized. Due to inadequate training on the hazards of isocyanate use, the individual was not aware of this increased sensitivity. In addition, the facility did not have a spray area with appropriate ventilation and had inadequate respiratory protection for the employees. When a subsequent exposure to the MDI occurred, it caused a fatal asthmatic reaction.

This unfortunate fatality may have been prevented if **any** of the following would have been in place:

- Adequate training of employees on the hazards of isocyanate exposure;
- Sufficient ventilation inside a spray room or booth;
- Respiratory protection that was properly selected, used, and maintained;
- Medical surveillance program for employees exposed to isocyanates.

What are isocyanates and how are they used?

Isocyanates are a group of highly reactive and toxic compounds used in the manufacture of urethanes, foams, fibers, and coatings such as paints and varnishes. Isocyanates are also found in the new and rapidly expanding business of spray-on truck-bed liners. The application of the spray-on truck-bed liner involves mixing a two-part product and spraying the polymerizing liquid onto a cleaned and scuffed truck bed.

MIOSHA has established permissible exposure limits for the isocyanate compounds methylene bisphenyl isocyanate (MDI) and toluene-2,4-diisocyanate (TDI). Both MDI and TDI have permissible exposure limits of 0.02 parts per million.

What are the hazards associated with isocyanates?

Immediate or acute effects of exposure to isocyanates include eye, nose, throat, and lung irritation, and allergic sensitization. Acute effects may also include stomach upset, vomiting, tightness in the chest, and possibly fevers.

Repeated exposure to low concentrations or a single exposure to high concentrations of isocyanates may result in skin rashes, permanent breathing problems including asthma, and hypersensitivity. Isocyanate exposure sensitizes workers making them subject to severe asthma attacks if they are exposed again, even at concentrations below the MIOSHA permissible exposure limits. In extreme cases, death can occur from the severe asthma attacks in sensitized individuals. If employees develop any lung symptoms consistent with isocyanate exposures, they should not be allowed future exposure to any amount of an isocyanate until a physician has determined they are at no additional risk.

How do you protect yourself and others from exposure to isocyanates?

Education and Training

An adequately trained workforce, including management and employees, is the first step in reducing or eliminating the hazards associated with the use of an isocyanate containing material. MIOSHA Hazard Communication Standards require employers to provide employees with information and training on any hazardous chemical in the work area. The training should include the location of the material safety data sheets (MSDSs), methods to detect the presence or release of a hazardous chemical, the health hazards associated with any hazardous chemical, and measures the employees can use to protect themselves from these hazards.

Exposure Assessments

Employers must determine their employees potential exposure to MDI or TDI. This will allow employers to evaluate engineering controls such as ventilation in order to reduce exposures to as low as reasonably achievable and aid in the selection of appropriate respiratory protection. The permissible exposure limits are found in the MIOSHA Part 301, Air Contaminants Standard.

Adequate Ventilation

Ventilation is probably the most important engineering control when combating exposures to an isocyanate or other air contaminant. The MIOSHA Part 528, Spray-finishing Operations Standard, requires that all spray-finishing operations be performed inside of an appropriate spray room or booth. In addition to providing ventilation, a spray room or booth also provides a work area that is easily restricted to only properly trained and equipped employees.

Respiratory Protection

Respiratory protection should not be the first line of defense to protect employees from isocyanate exposure or for that matter any air contaminant. Engineering controls such as ventilation should be designed and utilized to reduce exposure to as low as reasonably achievable before relying on respiratory protection.

The odor threshold, the level at which an individual can smell an isocyanate, is higher than the permissible exposure limits. In other words, if an employee smells the sweet, fruity, pungent odor of an isocyanate, they are probably overexposed. That is why the recommended respiratory protection for employees exposed to an isocyanate is usually a full-face supplied air respirator and not an air purifying respirator (filter cartridge style). The problem with the air purifying respirators is that they will reach a point at which it becomes saturated and will no longer filter out the isocyanate. When that filter breakthrough happens, an overexposure may occur, causing an irreversible sensitization.

Personal Protective Equipment

The eyes and skin of employees working with isocyanate containing products must be protected with the use of protective clothing and equipment. Coveralls, gloves, footwear, and eye protection are some of the things that should be considered when assessing the potential for contact. The MIOSHA Part 433, Personal Protective Equipment Standard requires employers to assess their workplace to determine the need for such equipment.

Medical Surveillance Program

It is recommended that employers provide employees exposed to isocyanate compounds with preplacement and annual physical examinations with emphasis on the respiratory tract, including the existence of respiratory conditions such as asthma and smoking history. Individuals who have become sensitized should be assigned to work areas where there is no expected isocyanate exposure.

How do I get help?

Compliance with the above MIOSHA standards may seem overwhelming at first but compliance is necessary to protect the health and safety of Michigan's workforce. The good news is that there is free assistance available from the MIOSHA Consultation Education & Training (CET) Division. You may contact the CET Division at 517.322.1809 or visit our website at www.michigan.gov/miosha.

10-02-03