MIOSHA Fact Sheet

Cadmium Exposure in Construction

MIOSHA Construction Standard Part 609, Cadmium in Construction (Part 609) applies to construction. Cadmium is a toxic metal commonly found in both manufacturing and construction workplaces. In its elemental form, cadmium is either a blue-white metal or a grayish-white powder found in lead, copper and zinc sulfide ores. Due to its low permissible exposure limit (PEL), overexposures to cadmium may occur even in situations where only trace quantities of cadmium are found. The PEL for cadmium is five micrograms per cubic meter of air ($5\mu g/m^3$) calculated as an eight-hour time-weighted average exposure (TWA).

Cadmium is found in some industrial paints and may represent a hazard when sprayed. Operations involving removal of cadmium paints by scraping or abrasive blasting may also pose a significant hazard.

A primary use of cadmium is as an anti-corrosive. It may be found in anti-fouling or anti-rust paints and is sometimes electroplated onto steel, nuts, bolts, and rivets. Cadmium may also serve as an electrode component in alkaline batteries and may be used in alloys, silver solders, and welding. Welding on cadmium-containing alloys or working with silver solders containing cadmium can unsuspectingly cause acute illness.

When paint chip samples are submitted to the laboratory for lead analysis, typically, a multiple metal-scan that includes analysis for cadmium is performed. If cadmium is detectable, the applicable rules of Part 609, must be addressed.

Health Effects:

Acute (short term) - Metal fume fever may result from acute exposure with flu-like symptoms of weakness, fever, headache, chills, sweating and muscular pain. Acute pulmonary edema usually develops within 24 hours and reaches a maximum by three days. If death from asphyxia does not occur, symptoms may resolve within a week.

Chronic (long term) - The most serious consequence of chronic cadmium poisoning is cancer (lung and prostate). The first observed chronic effect is generally kidney damage, manifested by excretion of excessive (low molecular weight) protein in the urine. Cadmium also is believed to cause pulmonary emphysema and bone disease (osteomalacia and osteoporosis). Cadmium exposure may also cause anemia, teeth discoloration and loss of smell (anosmia).

Employer Responsibilities:

Construction or maintenance activities that may result in exposure to cadmium include, but are not limited to: demolition; renovation and salvaging structures where cadmium or cadmium-containing materials are present; cutting, brazing, burning, grinding, or welding on surfaces that are painted or coated with cadmium-containing compounds; and transporting, storing, and disposing of cadmium or cadmium-containing materials on-site or at a location in which construction activities are performed.

Following are requirements of Part 609; many are triggered by the level of employee exposure to cadmium:

- Before performing work, where employees may be exposed to cadmium, an employer must establish the applicability of the rules and designate a "competent person" to act on the employer's behalf. The competent person must be capable of identifying existing and potential cadmium hazards in the workplace, the proper methods to control the hazards to protect workers, and have the authority necessary to take prompt corrective measures to eliminate or control such hazards.
- When disturbing suspect (i.e., painted) building materials, the competent person must determine if any amount of cadmium is present at the worksite. Bulk paint chip samples collected should be analyzed by a qualified laboratory.
- An employer whose work operation involves cadmium in any way must determine if any employee may be exposed to cadmium at or above the Action Level (AL) of 2.5µg/m^3, calculated as an 8-hour TWA. Employee exposure monitoring must be completed to determine the exposure levels.
- All employees who may be exposed to cadmium must be provided training in accordance with the standard.
- When employee exposures are determined to be at or in excess of the AL, the employer must implement periodic air monitoring.
- Medical surveillance is required for employees exposed above the AL for 30 or more days per year.

How to Avoid Hazards:

If cadmium is present at the worksite, the best way to prevent over-exposure to cadmium is to install and maintain engineering controls to eliminate or reduce the hazard. Examples of engineering and other work practice controls include:

- Provide interim protection (i.e., respirator and protective equipment, gloves, coveralls, etc.) until air monitoring determines exposure levels.
- Use exhaust ventilation and dust collection systems. Power tools used for grinding surfaces coated with cadmium containing paint can be equipped with localized exhaust ventilation dust collection systems.
- Do not dry sweep or use compressed air to clean work areas contaminated with cadmium materials; use wet methods or a vacuum equipped with a high efficiency particulate air (HEPA) filter.
- When employees are exposed above the PEL of 5µg/m^3, the employer must develop a compliance program that includes engineering and work practice controls. Comply with all requirements of Part 609 with regard to providing air monitoring, regulated areas, a written compliance program, use of protective clothing and equipment, housekeeping, medical surveillance and medical removal protection, employee information and training, warning signs, recordkeeping and hygiene facilities (i.e., change areas, shower and hand washing facilities and eating facilities).
- If engineering and work practice controls are not effective in reducing cadmium exposure to an acceptable level, the employer must provide respiratory protection. The type of respiratory protection required is based on the level of exposure determined by air monitoring. The minimum respirator required is a half mask, air-purifying respirator with HEPA filters. When respirators are used, the employer must then implement a respiratory protection program as required by MIOSHA General Industry and Construction Standard Part 451, Respiratory Protection.

For additional information regarding cadmium exposure in construction, please contact the Construction Safety and Health Division at 517-284-7680 or the Consultation Education and Training Division at 517-284-7720. MIOSHA Standards can be viewed on the MIOSHA website at www.michigan.gov/mioshastandards.

Additional information regarding cadmium exposure in construction and measures that can be implemented to protect employees is available on the following websites:

- https://www.osha.gov/SLTC/cadmium/index.html
- Cadmium Toxicity: What Diseases Are Associated with Chronic Exposure to Cadmium? | Environmental Medicine | ATSDR