3M

Regulations Update OH&ESD

#25 Hexavalent Chromium

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OSHA Regulation: 29 CFR 1910.1026; 1915.1026; 1926.1126

On February 28, 2006, the Occupational Safety and Health Administration (OSHA) issued a final rule for occupational exposure to hexavalent chromium [Cr(VI)]. The standard was published in the *Federal Register*, 71 *Fed.Reg.* 10100. The standard applies to general industry, shipyards, and construction. This summary of the Cr(VI) standard was prepared by 3M OH&ESD and focuses primarily on the respiratory protection aspects of the standard. It does not represent an official nor legal nor necessarily complete interpretation of the standard. If specific questions arise, the standard itself should be reviewed and relied on, rather than this summary.

I. Hexavalent Chromium

Chromium is a metal that exists in several oxidation or valence states, ranging from chromium (-II) to chromium (+VI). The hexavalent, Cr(VI) or chromate, is the second most stable state. It rarely occurs naturally; most Cr(VI) compounds are man made. The most common sources of occupational exposure to Cr(VI), in addition to the production and use of chromium metal and chromium metal alloys, are chromium electroplating; welding of metals containing chromium, particularly stainless steel or other high chromium steels, or with chromium coatings; and the production and use of Cr(VI)-containing compounds, particularly Cr(VI) pigments, but also Cr(VI) catalysts, chromic acid, and the production of chromium-containing pesticides.

II. Potential Health Effects

The primary health impairments from workplace exposure to Cr(VI) are lung cancer, asthma, and damage to the nasal epithelia and skin. For industrial exposure, inhalation and the skin are the primary routes of uptake. Occupational exposure to Cr(VI) can lead to nasal tissue ulcerations and nasal septum perforations. Effects on the skin are the result of two distinct processes: (1) Irritant reactions, such as skin ulcers and irritant contact dermatitis, and (2) delayed hypersensitivity (allergic) reactions.

III. Dates

Effective Date: May 30, 2006

Start-up Dates: All provisions of the standard **except** engineering controls take effect on the following dates:

- Employers with more than 20 employees — November 27, 2006
- Employers with 19 or fewer employees — May 30, 2007

For all employers, feasible engineering controls must be in place by May 31, 2010.

IV. Scope and Application

This standard applies to all occupational exposures to Cr(VI) in general industry, construction and shipyard employment, except:

- Exposures that occur in the application of pesticides regulated by the Environmental Protection Agency or another Federal government agency (*e.g.*, the treatment of wood with preservatives); or
- Exposures to portland cement; or
- Where the employer has objective data demonstrating that a material containing chromium or a specific process, operation, or activity involving chromium cannot release dusts, fumes, or mists of chromium (VI) in concentrations at or above 0.5µg/m^3 as an 8-hour time-weighted average (TWA) under any expected conditions of use.

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V. Definitions

The following is a partial list of definitions found in the Cr(VI) standard. These definitions were included because the terms are used in this document.

Action level means a concentration of airborne chromium (VI) of 2.5 micrograms per cubic meter ($\mu g/m^3$) calculated as an eight (8)-hour time-weighted average (TWA).

Chromium (VI) [hexavalent chromium or Cr(VI)] means chromium with a valence of positive six, in any form and in any compound.

Employee exposure means the exposure to airborne chromium (VI) that would occur if the employee were not using a respirator.

Historical monitoring data means data from chromium (VI) monitoring conducted prior to May 30, 2006, obtained during work operations conducted under workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations

Objective data means information such as air monitoring data from industry-wide surveys or calculations based on the composition or chemical and physical properties of a substance demonstrating the employee exposure to chromium (VI) associated with a particular product or material or a specific process, operation, or activity. The data must reflect workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

Physician or other licensed health care professional [PLHCP] is an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required by paragraph (k) of this section.

Regulated area means an area, demarcated by the employer, where an employee's exposure to airborne concentrations of chromium (VI) exceeds, or can reasonably be expected to exceed, the PEL.

VI. Permissible Exposure Limit (PELs)

The employer shall ensure that no employee is exposed to an airborne concentration of chromium (VI) in excess of 5 micrograms per cubic meter of air ($5\mu g/m^3$), calculated as an 8-hour time-weighted average (TWA).

VII. Exposure Determination

Each employer who has a workplace or work operation covered by this section shall determine the 8-hour TWA exposure for each employee exposed to chromium (VI). Two options are permitted.

- **Scheduled monitoring option**. The employer shall perform initial monitoring to determine the 8-hour TWA exposure for each employee on the basis of a sufficient number of personal breathing zone air samples to accurately characterize full shift exposure on each shift, for each job classification, in each work area.

– Where an employer does representative sampling instead of sampling all employees in order to meet this requirement, the employer shall sample the employee(s) expected to have the highest chromium (VI) exposures.

– If initial monitoring indicates that employee exposures are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

– If monitoring reveals employee exposures to be at or above the action level, the employer shall perform periodic monitoring at least every six months.

– If monitoring reveals employee exposures to be above the PEL, the employer shall perform periodic monitoring at least every three months.

– If periodic monitoring indicates that employee exposures are below the action level, and the result is confirmed by the result of another monitoring employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.

– The employer shall perform additional monitoring when there has been any change in the production process, raw materials, equipment, personnel, work practices, or control methods that may result in new

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or additional exposures to chromium (VI), or when the employer has any reason to believe that new or additional exposures have occurred.

- **Performance-oriented option**. The employer shall determine the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data, historical monitoring data, or objective data sufficient to accurately characterize employee exposure to chromium (VI).

VIII. Regulated Areas

This requirement does not apply to construction and shipyard employers.

The employer shall establish a regulated area wherever an employee's exposure to airborne concentrations of chromium (VI) is, or can reasonably be expected to be, in excess of the PEL. Regulated areas shall be demarcated from the rest of the workplace in a manner that adequately establishes and alerts employees of the boundaries of the regulated area. Access to regulated areas shall be limited.

IX. Methods of Compliance

The employer shall use engineering and work practice controls to reduce and maintain employee exposure to chromium (VI) to or below the PEL unless the employer can demonstrate that such controls are not feasible. Wherever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer shall use them to reduce employee exposure to the lowest levels achievable, and shall supplement them by the use of respiratory protection that complies with the requirements of paragraph (g) of this section. Exceptions:

- Where painting of aircraft or large aircraft parts is performed in the aerospace industry, the employer shall use engineering and work practice controls to reduce and maintain employee exposure to chromium (VI) to or below 25μg/m^3 unless the employer can demonstrate that such controls are not feasible. The employer shall supplement such engineering and work practice controls with the use of respiratory protection that complies with the requirements of paragraph (g) of this section to achieve the PEL of 5μg/m^3.
- Where the employer can demonstrate that a process or task does not result in any employee exposure to chromium (VI) above the PEL for 30 or more days per year (12 consecutive months), the requirement to implement engineering and work practice controls to achieve the PEL does not apply to that process or task.

Rotation of employees to different jobs to comply with the PEL is not permitted.

X. Respiratory Protection

The employer shall provide respiratory protection for employees in the following circumstances:

- While engineering and work practice controls are being developed;
- During maintenance and repair activities for which engineering and work practice controls are not feasible;
- When all feasible engineering and work practice controls are implemented and are still not sufficient to reduce exposures to or below the PEL;
- When employees are exposed above the PEL for fewer than 30 days per year, and the employer has elected not to implement engineering and work practice controls;
- Emergencies.

Where respirator use is required, the employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134. This applies to all aspects of respirator selection, use and care. There is no respirator selection table specific to the Cr(VI) standards. Thus, as with most other air contaminants, elastomeric or filtering half facepieces with class 95 filters may be used up to 10X the PEL and full facepieces with class 95 filters may be used up to 50X the PEL when quantitatively fit tested, etc. If oil is present in the atmosphere along with Cr(VI), R or P series filters must be used. OSHA plans to publish a table of assigned protection factors (APF) for all respirator types in the near future.

XI. Protective Work Clothing and Equipment

Where a hazard is present or is likely to be present from skin or eye contact with chromium (VI), the employer shall provide appropriate personal

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protective clothing and equipment at no cost to employees, and shall ensure that employees use it.

XII. Medical Surveillance

The employer shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for all employees:

- Who are or may be occupationally exposed to chromium (VI) at or above the action level for 30 or more days a year;
- Experiencing signs or symptoms of the adverse health effects associated with chromium (VI) exposure; or
- Exposed in an emergency.

All medical examinations and procedures must be performed by or under the supervision of a PLHCP.

The employer shall provide the PLHCP, among other things, a copy of this standard; a description of the affected employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to chromium (VI); the employee's former, current, and anticipated levels of occupational exposure to chromium (VI); and a description of any personal protective equipment used or to be used by the employee, including when and for how long the employee has used that equipment.

The employer shall obtain a written medical opinion from the PLHCP which contains, among other things, any recommended limitations upon the employee's exposure to chromium (VI) or upon the use of personal protective equipment such as respirators.

XIII. Communication of Chromium (VI) Hazards to Employees

In addition to the requirements of the Hazard Communication Standard, 29 CFR 1910.1200, employers shall ensure that each employee can at least demonstrate knowledge of the contents of this section and the purpose and a description of the required medical surveillance program.

XIV. Recordkeeping

A. Air monitoring data

The employer shall maintain an accurate record of all air monitoring conducted to comply with the requirements of this section. This record shall include at least the following information:

- The date of measurement for each sample taken;
- The operation involving exposure to chromium (VI) that is being monitored;
- Sampling and analytical methods used and evidence of their accuracy;
- Number, duration, and the results of samples taken;
- Type of personal protective equipment, such as respirators worn;
- Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

B. Historical monitoring data

Where the employer has relied on historical monitoring data to determine exposure to chromium (VI), the employer shall establish and maintain an accurate record of the historical monitoring data relied upon. The record shall include information that reflects the following conditions:

- The data were collected using methods that meet the accuracy requirements of paragraph (d)(5) of this section;
- The processes and work practices that were in use when the historical monitoring data were obtained are essentially the same as those to be used during the job for which exposure is being determined;
- The characteristics of the chromium (VI) containing material being handled when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined;
- Environmental conditions prevailing when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined;
- Other data relevant to the operations, materials, processing, or employee exposures covered by the exception.

C. Objective data

The employer shall maintain an accurate record of all objective data relied upon to comply with the requirements of this section. This record shall include at least the following information:

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- The chromium containing material in question;
- The source of the objective data;
- The testing protocol and results of testing, or analysis of the material for the release of chromium (VI);
- A description of the process, operation, or activity and how the data support the determination;
- Other data relevant to the process, operation, activity, material, or employee exposures.

D. Medical surveillance

The employer shall establish and maintain an accurate record for each employee covered by medical surveillance under paragraph (k) of this section. The record shall include the following information about the employee:

- Name and social security number;
- A copy of the PLHCP's written opinions;
- A copy of the information provided to the PLHCP as required by paragraph (k)(4) of this section.

All records must be maintained and made available in accordance with 29 CFR 1910.1020.

For more information, please contact:

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