## Hexavalent Chromium

1. **Purpose**

The purpose of this program is to establish guidelines for employees and contractors when performing work activities where hexavalent chromium may be present.

1. **Responsibility**

Senior management will provide the resources, guidance, equipment, and enforcement necessary to protect personnel from exposure to hexavalent chromium and ensure compliance with this policy.

All personnel will:

* Know and understand the hazards of hexavalent chromium exposure
* Comply with all elements of this program to prevent hexavalent chromium exposure
* Use engineering and work practice controls in place to prevent hexavalent chromium. Use appropriate PPE as directed
* Attend scheduled hexavalent chromium training as directed by the Environmental, Health and Safety Department.

Environmental, Health and Safety (EHS) Department will assist supervisors, managers, and other employees to implement and maintain the elements of this policy. EHS personnel will ensure that employees receive training for hexavalent chromium.

1. **Physical and Chemical Characteristics of Chromium (VI)**

* The metal, chromium (Cr), is a steel-gray solid with a high melting point and an atomic weight of 51.996 g/mol.  Chromium has oxidation states ranging from chromium (-II) to chromium (+VI).
* Chromium forms a large number of compounds, in both the chromium (III) and the chromium (VI) forms.  Chromium compounds are stable in the trivalent state, with the hexavalent form being the second most stable state.
* The chromium (III) compounds are sparingly soluble in water and may be found in water bodies as soluble chromium (III) complexes, while the chromium (VI) compounds are readily soluble in water.

1. **Health Effects of Hexavalent Chromium**

* Chromium (VI) is much more toxic than chromium (III), for both acute and chronic exposures.
* The respiratory tract is the major target organ for chromium (VI) following inhalation exposure in humans.  Shortness of breath, coughing, and wheezing were reported in cases where an individual inhaled very high concentrations of chromium trioxide.
* Other effects noted from acute inhalation exposure to very high concentrations of chromium (VI) include gastrointestinal and neurological effects, while dermal exposure causes skin burns in humans.
* Ingestion of high amounts of chromium (VI) causes gastrointestinal effects in humans and animals, including abdominal pain, vomiting, and hemorrhage.

1. **Regulatory Limits for Chromium (VI)**

No employee shall be exposed in excess of the PEL of 5 micrograms per cubic meter of air as an 8-hour TWA. OSHA Permissible Exposure Limit (PEL)

8-hour Time-Weighted Average .............................. 5 µg/m3

Action Level ……………………………………………2.5 µg/m3.

1. **Regulated Areas**

A regulated area shall be established wherever the airborne concentration of chromium (Vl) exceeds or can reasonably be expected to exceed the PEL. Access to regulated areas shall be limited to authorized persons and marked with warning signs to alert employees.

1. **Exposure Monitoring**

Personnel exposure to chromium (VI) above the Action Level is evaluated to determine how to eliminate or provide proper engineering/administrative controls or PPE. The following measures are in place to monitor employee chromium (VI) exposure:

a. Initial monitoring - of workplaces and work operations

b. Periodic monitoring and monitoring frequency

* at or above the action level – every six months.
* above the TWA - every six months.
* above the PEL – every three months.

c. Additional monitoring

* when a change in the production process, raw materials, equipment, personnel, work practices, or control methods which may result in new or additional exposure to chromium (VI).

d. Employee notification of monitoring results - within 15 working days of receipt of results the employer shall notify in writing or post results.

1. **Methods of Compliance**

The source of exposure is reduced to the lowest feasible level using the hierarchy of controls including engineering, work practice controls, personal protective equipment and enforcement of this procedure to minimize employee exposure if the exposure level is above the permissible limit for more than 30 days per year. Wherever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, why such types of controls are not feasible to reduce employee exposures shall be documented. The documentation will include an explanation of types of engineering and/or work practice controls that will help reduce employee exposure to chromium (VI) even partially, and type(s) of respiratory protection to protect employees from the balance of the exposure.

1. **Respiratory Protection for Hexavalent Chromium**

Respirators shall be provided in accordance with 1910.134. The following guidelines shall be used for respiratory protection:

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| --- | --- |
| **Employee Exposure** | **Respiratory Protection Needed** |
| 0 to 2.5 µg/m3 | No Respirator required |
| 2.5 µg/m3 to 5 µg/m3 | Under the PEL – No Respirator required |
| 5 µg/m3 to 50 µg/m3 | Half-mask air purifying respirator (APR) with P100 filters. |
| 50 µg/m3 to 125 µg/m3 | Full-face air purifying respirator (APR) with HEPA filters |
| 125 µg/m3 to 250 µg/m3 | Full-face air purifying respirator (APR) with P100 filters, PAPR half mask with HEPA filters, or supplied air half mask |
| 250 µg/m3 to 5,000 µg/m3 | PAPR full facepiece or hood with HEPA filters, or  supplied air full facepiece or hood. |
| > 5,000 µg/m3 | self-contained breathing apparatus (SCBA) |

When air-purifying respirators are used, the employees will replace the air-purifying element (cartridge) at the expiration of service life, or at the beginning of each shift in which they will be used, whichever comes first. Respiratory protection is required during:

* Periods necessary to install or implement feasible engineering and work practice controls;
* Work operations, such as maintenance and repair activities, for which engineering and work practice controls are not feasible;
* Work operations for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL;
* Work operations where 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 to achieve the PEL; or
* Emergencies.

1. **Protective Clothing and Equipment**

PPE shall be provided when there is a hazard from skin or eye contact. The selection of PPE will be at no cost to employees and will be based upon the working conditions, amount and duration of exposure, and other environmental factors. Selection of PPE for protection from chromium (VI) will be conducted by the Environmental, Safety and Health Department or on-site safety professional.

1. **Removal and Storage**

* Remove all protective clothing and equipment contaminated with chromium (VI) at the end of the work shift or at the completion of their tasks involving chromium (VI) exposure, whichever comes first.
* No employee shall remove chromium (VI) contaminated protective clothing or equipment from the workplace, except for those employees whose job it is to launder, clean, maintain, or dispose of such clothing or equipment.
* When contaminated protective clothing or equipment is removed for laundering, cleaning, maintenance, or disposal, the employer shall ensure that it is stored and transported in sealed, impermeable bags or other closed, impermeable containers.
* Bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal shall be labeled in accordance with the requirements of the Hazard Communication Standard, 29 CFR 1910.1200.

1. **Cleaning and Replacement**

* Clean, launder, repair and replace all protective clothing and equipment to maintain its effectiveness.
* Removal of chromium (VI) from protective clothing and equipment by blowing, shaking, or any other means that disperses chromium (VI) into the air or onto an employee's body is prohibited.
* Any person who launders or cleans protective clothing or equipment contaminated with chromium (VI) shall be informed of the potentially harmful effects of exposure to chromium (VI).

1. **Hygiene Areas and Practices**

* Where protective clothing and equipment is required, change rooms shall be provided.
* Change rooms are equipped with separate storage facilities for protective clothing and equipment and for street clothes, and that these facilities prevent cross-contamination.
* Where skin contact with chromium (VI) may occur washing facilities are provided.
* Employees who have skin contact with chromium (VI) shall wash their hands and faces at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.
* Ensure that employees do not enter eating and drinking areas with protective work clothing or equipment unless surface chromium (VI) has been removed from the clothing and equipment by methods that do not disperse chromium (VI) into the air or onto an employee's body.

1. **Housekeeping**

* All surfaces shall be maintained as free as practicable of accumulations of chromium (VI).
* All spills and releases of chromium (VI) containing material shall be cleaned up promptly.
* Surfaces contaminated with chromium (VI) are cleaned using a HEPA-filter vacuum to minimize the likelihood of exposure.
* Dry shoveling, dry sweeping, and dry brushing may be used only where HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure to chromium (VI) have been tried and found not to be effective.
* Compressed air shall not be used to remove chromium (VI) from any surface.
* Waste, scrap, debris, and any other materials contaminated with chromium (VI) and consigned for disposal are collected and disposed in sealed, impermeable bags or other closed, impermeable containers.
* Ensure that all necessary hazardous waste disposal permits and licenses are in place before any waste is disposed.
* Bags or containers of waste, scrap, debris, and any other materials contaminated with chromium (VI) that are consigned for disposal are labeled in accordance with the requirements of the Hazard Communication Standard, 29 CFR 1910.1200.

1. **Medical Surveillance**

A chromium (VI) medical examination shall be provided to affected personnel by or under the supervision of a physician or other licensed health care professional. Medical evaluations will be provided at no cost to employees. The employer shall obtain and provide employee with written copy of physician’s opinion within 30 days of examination. Medical examinations shall include the following elements:

* Detailed medical and occupational history
* Complete physical examination of the skin and respiratory tract
* Additional tests as necessary

Medical evaluations shall be conducted:

* Annually
* For employees who are or may be exposed to chromium (VI) at or above the action level 30 or more days per year
* Within 30 days after initial assignment, unless the employee has received a chromium (VI) related medical examination within the last twelve months;
* Within 30 days after a PLHCP's written medical opinion recommends an additional examination
* Whenever an employee shows signs or symptoms of the adverse health effects associated with chromium (VI) exposure
* Within 30 days after exposure during an emergency which results in an uncontrolled release of chromium (VI); or
* At the termination of employment or termination of exposure.

1. **Employee Information and Training**

Each employee shall demonstrate knowledge of at least the following:

* Chromium (Vl) hazards
* Chromium (Vl) Policy
* Medical surveillance
* Control Methods

1. **Communication of Hexavalent Chromium**

Signs, labels, and verbal (briefings, training) shall be used to communicate chromium (VI) hazards to employees. A copy of 29 CFR 1910.1026 shall be readily available without cost to all affected employees. Markers will be installed (e.g., signs, labels, barriers) to alert personnel of the boundaries of the chrome (VI) regulated area(s).

1. **Document Management**

Records shall be maintained for employee exposure, medical surveillance, air monitoring data, historical monitoring data, objective data, exposure levels and respiratory devices to be worn and training records. Exposure records are kept for 30 years after employee termination or after the completion of the job or project.

Exposure and medical monitoring records are made available to the affected employees or their representatives and OSHA upon their request. Any transfer of the records will require written approval of the Environmental, Safety and Health Department.