

Exposure to Hexavalent Chromium from Welding

Hexavalent Chromium

Hexavalent chromium is a toxic form of the element chromium, found mainly in products of industrial processes such as metal finishing, wood preservatives, fungicides, pigments in dyes, paints, and plastics. Hexavalent chromium is also present in fumes generated from welding stainless steel, chromium alloys, and welding rods.

Hexavalent chromium is harmful to the eyes, skin, and respiratory system. Inhaling airborne hexavalent chromium may negatively affect a worker's health over time. It is important that employers and workers cooperate to protect the health of workers.

The American Conference of Governmental Industrial Hygienists (ACGIH) is a private, scientific association that publishes guidelines for Threshold Limit Values (TLVs), which are the safe levels of exposure to chemical and physical substances found in workplaces. They use an 8 hour time period, which is considered the length of a normal work day, to calculate exposure levels. This is referred to as a Time Weighted Average (TWA).

Hexavalent chromium is classified as a carcinogen which may cause lung cancer and asthma when inhaled. As a result of this classification, the ACGIH has significantly reduced the allowable exposure levels of hexavalent chromium over the past number of years. The acceptable exposure limit (TLV-TWA) to hexavalent chromium is 0.0002 mg/m^3 . Exposure to hexavalent chromium above this level is considered to be a serious risk to a worker's health.

What Employers Can Do

Section 11 of the Occupational Health and Safety Regulations require employers to maintain the air in working areas at or below the ACGIH prescribed TLVs. Therefore, employers who have stainless steel welding processes, or other similar tasks, must protect their workers from being exposed to hexavalent chromium levels above the prescribed TLV. This should include the following:

Engineering Controls

Reduce exposure to levels under the ACGIH prescribed TLV, if possible, through the use of engineering controls such as enclosures and source extraction ventilation. See Figure 1.

Occasional air quality sampling is suggested to ensure the workplace ventilation is adequate. This is a good example of due diligence.



Figure 1: Welder using extraction ventilation.

Personal Protective Equipment

Provide appropriate respirators to exposed workers. Respirators must be selected and fit tested according to the CSA Standard Z94.4, "Selection, Use and Care of Respirators." Ensure that workers are trained on how to use, store, and maintain respirators so they continue to meet the CSA standard. If in doubt, check with a supplier or manufacturer for selecting the best respirator for the hazard.

Safe Work Practices

Develop safe work procedures that include appropriate worker hygiene and ventilation use. The employer must train workers and supervise them to ensure the procedures are being followed.

Medical Surveillance Program

The employer is advised to monitor worker exposure levels through a medical surveillance program, which may require workers to attend medical exams involving blood work and urinalysis to determine whether levels of hexavalent chromium are in the body. If a medical professional finds a level of hexavalent chromium in the worker's body that indicates the worker is being exposed beyond ACGIH prescribed TLVs, the employer must determine whether the workplace protective measures are appropriate and make the necessary changes.

What Workers Can Do

Workers are required to take every reasonable precaution to protect their health and safety. This includes being obligated to report hazards. If a worker suspects workplace exposure to airborne hexavalent chromium, they must report this hazard to the employer. Consult with the safety committee and/or safety representative if one is present at the workplace.

Workers are obligated to cooperate with the employer, which means:

- following required safe work procedures;
- wearing the personal protective equipment that the employer determines necessary to protect workers from hazards; and
- cooperating with any medical surveillance program the employer deems appropriate.

Remember, welding gases and fumes do not normally cause immediate health problems. However, years of welding work that exposes workers to levels of hexavalent chromium greater than the ACGIH prescribed TLV increases a worker's likelihood of developing health problems.

Employers and workers cooperating together to protect the worker's health is the key to success.



Figure 2: Workers and Employer working together.

If you have questions on this or any workplace safety topic, contact WCB Occupational Health & Safety at 902-368-5697 or toll free 1-800-237-5049, or visit our website at wcb.pe.ca.