



## SPECIALTY STEEL INDUSTRY OF NORTH AMERICA

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### SAMPLING METHOD

Below is the sampling method (OSHA ID 215) and protocol that should be used to sample for hexavalent chromium (Cr(VI)).

Hexavalent Chromium [Cr(VI)]

OSHA Method Number: ID-215 (This method supersedes ID-103)

Matrix: Air

OSHA Permissible Exposure Limit  
(proposed)

Hexavalent Chromium [Cr(VI)]  
Time Weighted Average (TWA): 5.0  $\mu\text{g}/\text{m}^3$   
Action Level (AL): 2.5  $\mu\text{g}/\text{m}^3$

Collection Device: An air sample is collected using a 37-mm diameter polyvinyl chloride (PVC) filter (5- $\mu\text{m}$  pore size) contained in a polystyrene cassette. A calibrated sampling pump is used to draw a representative air sample from the breathing zone of an employee through the cassette and collect particulate on the filter.

Recommended Sampling Rate: 2 liters per minute (L/min)

Recommended Air Volume:  
TWA and AL: 960 L (2 L/min for 480 min)

Analytical Procedure: The hexavalent chromium, Cr(VI), is extracted from the PVC filter using an aqueous solution containing 10% sodium carbonate  $\text{Na}_2\text{CO}_3$ / 2% sodium bicarbonate ( $\text{NaHCO}_3$ ) and the mixture of phosphate buffer/magnesium sulfate [ $\sim 10$  mg as Mg (II)]. After dilution, an aliquot of this solution is analyzed for Cr(VI) by an ion chromatograph equipped with a UV-vis detector at 540-nm wavelength. A post-column

derivatization of the Cr(VI) with 1,5-diphenyl carbazide is performed prior to detection.

Detection Limit

Qualitative:  $1.0 \times 10^{-3} \mu\text{g}/\text{m}^3$  as Cr(VI) (960-L air sample)  
Quantitative:  $3.0 \times 10^{-3} \mu\text{g}/\text{m}^3$  as Cr(VI) (960-L air sample)

Precision and Accuracy  
(Soluble and Insoluble)

Validation Range: 0.12 to 0.42  $\mu\text{g}/\text{m}^3$  (960-L air sample)  
CV1(pooled): 0.059  
Bias: -0.004  
Overall Error: +/- 12.9%

Method Classification: Validated Method

**JOB CATEGORIES THAT MAY EXPERIENCE CR(VI) EXPOSURES**

OSHA identified job categories and/or mill operations in steel producing facilities where hexavalent chromium (Cr(VI)) exposures may be expected in the steel industry. A number of individual steel companies recently provided us exposure data that had been collected at their facilities as part of our effort to comment on the proposed rule. We have identified below those job categories/mill operations identified by either OSHA or individual companies where Cr(VI) exposures were recorded. We recommend focusing any sampling efforts in these areas.

- Raw material handling
- Furnace operators
- Furnace helpers/laborers
- Crane operators
- Continuous casting operators
- Rolling mill operators
- Steel conditioning operators
- Annealing furnace operators
- Pickling house operators
- Welding and cutting operations
- Caster torch cutting
- Melt shop storeroom personnel
- Melt shop maintenance
- Remelt shop operators
- Ladle crew
- Reheat furnace
- Kolene salt baths
- AOD operator
- Ladle stir station

Ladle metallurgy station  
Elektro slag remelting station  
Melt specialist  
Melt shop AOD, ladle, and slag pot clean-up and preparation  
Tundish clean-up and preparation  
Slag handling, slag crushing  
Continuous casting at the roll-out level, torching-to-length  
All maintenance mechanics and electricians in melt shop, casting and hot mill areas  
Home scrap handlers torching steel  
High pressure water descaling in the hot rolling mill  
Hot rolling mill floor helpers including torching up cobbles  
Roll grinders  
Plasma cutting  
Shot blasting operators  
Annealing line welders  
Electrolytic sodium sulfate pickling operators  
Inspectors and manual grinders  
Grinding and polish line operators  
Carlite coating of electrical steel  
Other maintenance (including roll grinding)

If you have questions on hexavalent chromium, please contact Kate McMahon at 202-342-8419. Ms. McMahon practices environmental law at the Washington, D.C. office of Kelley Drye Collier Shannon.

Thank you for your continuing assistance.

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