

# FIELD EVALUATION OF A SAMPLING AND ANALYTICAL METHOD FOR ENVIRONMENTAL LEVELS OF AIRBORNE HEXAVALENT CHROMIUM

**Patrick Sheehan  
Rene Ricks  
Stephen Ripple  
Dennis Paustenbach**

ChemRisk, A Division of McLaren/Hart, 1135 Atlantic Avenue, Alameda, CA 94501

*Hexavalent chromium, Cr(VI), has been classified as a human respiratory carcinogen. Airborne Cr(VI) emissions are associated with a number of industrial sources including metal plating, tanning, chromite ore processing, and spray painting operations; combustion sources such as automobiles and incinerators; and fugitive dusts from contaminated soil. There has been considerable interest within industry and the regulatory community to assess the potential cancer risks of workers exposed to Cr(VI) at levels substantially below the threshold limit value (TLV) of 50  $\mu\text{g}/\text{m}^3$ . To date, only the workplace sampling and analytical method (National Institute for Occupational Safety and Health [NIOSH] Method 7600) has been validated for measuring airborne Cr(VI), and it can accurately measure concentrations only as low as 500  $\text{ng}/\text{m}^3$ . This paper describes the field evaluation of a sampling and analytical method for the quantitation of airborne Cr(VI) at concentrations 5000 times lower than the current standard method (as low as 0.1  $\text{ng}/\text{m}^3$ ). The collection method uses three 500-mL Greenberg-Smith impingers in series, operated at 15 Lpm for 24 hr. All three impingers are filled with 200 mL of a slightly alkaline (pH ~8) sodium bicarbonate buffer solution. The results of validation tests showed that both Cr(VI) and trivalent chromium, Cr(III), were stable in the collection medium and that samples may be stored for up to 100 days without appreciable loss of Cr(VI). Method precision based on the pooled coefficient of variation for replicate samples was 10.4%, and method accuracy based on the mean percent recovery of spiked samples was 94%. Both the precision and accuracy of the impinger method were within NIOSH criteria. This method could be used to measure ambient concentrations of Cr(VI) in the workplace caused by fugitive emissions from manufacturing processes or chromium-contaminated soils at workplace concentrations well below the current TLV (50  $\mu\text{g}/\text{m}^3$ ) or permissible exposure limit (100  $\mu\text{g}/\text{m}^3$ ).*