

Health-Based Soil Action Levels for Trivalent and Hexavalent Chromium: A Comparison with State and Federal Standards

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As part of the Brownfields initiatives being enacted at both the state and federal levels, environmental regulatory agencies are developing health-based screening or action levels to facilitate the reclamation of unused industrial properties. By the end of 1997, approximately 90% of the states will have either adopted federal values or developed their own non-site-specific action levels. These standards can be applied as default cleanup levels, or alternative remediation standards may be developed based on a site-specific risk assessment. A state and federal survey of cleanup levels for hexavalent and trivalent chromium [Cr(VI) and Cr(III)] indicated a general concurrence of approaches (i.e., most states are using the USEPA standard risk assessment model with upper-bound estimates of exposure and USEPA toxicity criteria), although the proposed values vary by as much as 5 orders of magnitude. To understand the variability and uncertainty in these levels, the USEPA Soil Screening Level (SSL) (1996a) equations were calculated for Cr(III) and Cr(VI) by Monte Carlo analysis to develop probability density functions of health-based action levels (HBALs) for residential and industrial land uses. The lowest HBALs were developed for Cr(VI) for the inhalation of particulates pathway (residential = 892 mg/kg; non-residential = 105 mg/kg); therefore, states and regions that do not consider this pathway may have cleanup standards for Cr(VI) that are not adequately protective of public health. It was determined that Cr(III) HBALs are not necessary (lowest value calculated was 178,000 mg/kg for a residential site) due to the very low toxicity of Cr(III). HBALs for the protection of groundwater are extremely variable, and a tiered approach similar to that developed by the USEPA for the SSL framework, which allows for incorporation of some site-specific information, is most appropriate.