

## Soil Suspension/Dispersion Modeling Methods for Estimating Health-Based Soil Cleanup Levels of Hexavalent Chromium at Chromite Ore Processing Residue Sites

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### ABSTRACT

The primary health concern associated with exposures to chromite ore processing residue (COPR)-affected soils is inhalation of hexavalent chromium [Cr(VI)] particulates. Site-specific soil alternative remediation standards (ARSs) are set using soil suspension and dispersion models to be protective of the theoretical excess cancer risk associated with inhalation of soil suspended by vehicle traffic and wind. The purpose of this study was to update a previous model comparison study that identified the 1995 AP-42 particulate emission model for vehicle traffic over unpaved roads and the Fugitive Dust Model (FDM) as the most appropriate model combination for estimating site-specific ARSs. Because the AP-42 model has been revised, we have updated our past evaluation. Specifically, the 2006 AP-42 particulate emissions model; the Industrial Source Complex-Short Term model, version 3 (ISCST3); and the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) air dispersion models were evaluated, and the results were compared with those from the previously used modeling approaches. Two sites with and two sites without vehicle traffic were evaluated to determine if wind erosion is a significant source of emissions. For the two sites with vehicle traffic, both FDM and ISCST3 produced total suspended particulate (TSP) estimates that were, on average, within a factor of 2 of measured; whereas AERMOD produced estimates that were as much as 5-fold higher than measured. In general, the estimated TSP concentrations for FDM were higher than those for ISCST3. For airborne Cr(VI), the ISCST3 model produced estimates that were only 2- to 8-fold of the measured concentrations, and both FDM and AERMOD estimated airborne Cr(VI) concentrations that were approximately 4- to 14-fold higher than measured. Results using the 1995 AP-42 model were closer to measured than those from the 2006 AP-42 model. Wind erosion was an insignificant contributor to particulate emissions at COPR sites.