

## ASSESSMENT OF THE HUMAN HEALTH RISKS POSED BY EXPOSURE TO CHROMIUM- CONTAMINATED SOILS

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*Millions of tons of chromite-ore processing residue have been used as fill in various locations in northern New Jersey and elsewhere in the United States. The primary toxicants in the residue are trivalent chromium [Cr(III)] and hexavalent chromium [Cr(VI)]. The hazard posed by Cr(III) is negligible due to its low acute and chronic toxicity. In contrast, Cr(VI) is a human carcinogen following inhalation of high concentrations. It can also cause allergic contact dermatitis. This evaluation addresses a residential site where the arithmetic mean (x) and geometric mean (gm) concentrations of Cr(III) in soil were 2879 and 1212 mg/kg (ppm). The mean and geometric mean concentrations of Cr(VI) were 180 and 4 mg/kg, respectively. The uptake (absorbed dose) of Cr(III) via soil ingestion, consumption of homegrown vegetables, and ingestion of inspired particles was determined. The uptake of Cr(VI) via dermal absorption from contact with surface soil and building wall surfaces, as well as inhalation, was also evaluated. The techniques used in this assessment are applicable for evaluating the human health risks posed by any residential site having contaminated soil. The potential for both sensitized and unsensitized persons to develop allergic contact dermatitis due to exposure to soil contaminated at these levels was found to be negligible. The estimated average daily dose (ADD) via ingestion and dermal absorption for the maximally exposed individual (MEI) was about 1500- and 40-fold below the EPA reference dose (RfD) for Cr(III) and Cr(VI), respectively. It was shown that for residential sites, the most important route of exposure to Cr(III) was incidental soil ingestion. Although not relevant to these sites specifically, if garden vegetables could be successfully grown in these soils, then they would probably be the predominant source of uptake of Cr(III). Since inhalation of Cr(VI)-contaminated dust (but not ingestion or dermal contact) poses a cancer hazard, the doses and associated risks were assessed. The estimated cancer risks for the MEI and most likely exposed individual (MLEI) were approximately  $5 \times 10^{-9}$  and  $2 \times 10^{-9}$ , respectively. These levels of risk have always been considered well below those that warrant regulatory concern. For persons living on residential properties, the cancer risk due to inhaling suspended particles is likely to be less than 1 in 1,000,000 if Cr(VI) levels in soil are less than 180 mg/kg (ppm). Based on this analysis, the levels of Cr(III) and Cr(VI) at this and similar sites do not pose a health hazard following acute or chronic exposure.*