

Assessing the Potential Environment and Human Health Risks of Contaminated Soil¹

Millions of yards of soil in the United States have been contaminated with varying concentrations of exogenous chemicals. The bulk of the contaminated dirt resides in landfills or within industrial sites. In general, humans will not be exposed to soils containing potentially harmful amounts of these contaminants because of limited access to the site, because the contaminated soil is usually buried (not at the soil surface), and because many soil contaminants are not volatile. There are, however, certain circumstances where toxic contaminants present in soil might present a human health hazard such as following the industrial accident that occurred in Seveso, Italy or as a result of less-than-adequate waste disposal practices. In some areas, such as abandoned industrial sites or neighborhoods where very high concentrations of lead are present in the soil, children and adults can be at risk. For these situations, an established procedure for estimating the potential uptake of chemicals in soil by humans and wildlife, so that the associated risks can be quantified, would be useful. This paper reviews many of the key parameters that need to be considered when estimating the likely daily uptake of a particular soil contaminant by humans through the dermal, inhalation, or oral routes of entry. Throughout this discussion, dioxin contaminated soil will be used to illustrate how this risk evaluation process can be applied. In general, human exposure to airborne dust derived from hazardous waste sites is unlikely to produce exposures that would pose a health hazard. The primary hazard posed by contaminated soil is unintentional ingestion of the soil by adults, ingestion by toddlers due to mouthing tendencies, and excessive dermal exposure. Contaminated soil can also present a health hazard to the food chain due to ingestion of soil by grazing animals or uptake by plants. The contamination of milk from grazing cattle will not usually be a concern in the United States because few animals graze on pastures which have been treated with sludges and few animals graze on sparsely vegetated pasture. Lastly, chemicals that are not strongly bound to soil should be carefully evaluated for their potential to leach into groundwater or to be transported on particles into streams.

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