

IDENTIFYING SOIL CLEANUP CRITERIA FOR DIOXINS IN URBAN RESIDENTIAL SOILS: HOW HAVE 20 YEARS OF RESEARCH AND RISK ASSESSMENT EXPERIENCE AFFECTED THE ANALYSIS?

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This article reviews the scientific evidence and methodologies that have been used to assess the risks posed by 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and presents a probabilistic analysis for identifying virtually safe concentrations of TCDD toxicity equivalents (TEQ) in residential soils. Updated data distributions that consider state-of-the-science cancer and non-cancer toxicity criteria, child soil ingestion and dermal uptake, bioavailability in soil, and residential exposure duration are incorporated. The probabilistic analysis shows that the most sensitive determinants of dose and risk are childhood soil ingestion, exposure duration, and the selected TCDD cancer potency factor. It also shows that the cancer risk at 1 per 100,000 predicted more conservative (lower) soil criteria values than did the noncancer hazard (e.g., developmental and reproductive effects). In this analysis, acceptable or tolerable soil dioxin concentrations (TCDD TEQ) ranged from 0.4 to 5.5 ppb at the 95th percentile for cancer potency factors from 9600 to 156,000 (mg/kg/d)⁻¹ with site-specific adjustments not included. Various possible soil guidelines based on cancer and noncancer risks are presented and discussed. In the main, the current toxicology, epidemiology, and exposure assessment data indicate that the historical 1 ppb TEQ soil guidance value remains a reasonable screening value for most residential sites. This analysis provides risk managers with a thorough and transparent methodology, as well as a comprehensive information base, for making informed decisions about selecting soil cleanup values for PCDD/Fs in urban residential settings.