EVALUATION OF POTENTIAL TRANSMISSION OF 2,3,7,8–TETRACHLORODIBENZO-*p*-DIOXIN–CONTAMINATED INCINERATOR EMISSIONS TO HUMANS VIA FOODS

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Interest in the potential sources of human exposure to TCDD (dioxins, TCDD and equivalents, or 2,3,7,8-tetrachlorodibenzo-p-dioxin) via foods has recently shifted from phenoxy herbicides to products of combustion and waste disposal. Proposals to locate municipal waste combustors in rural areas have raised concerns that emissions, which could contain TCDD, could contaminate animal feeds and such human foods as milk, meat, and vegetables. Important factors that can affect the results of an assessment of incinerator emissions include (1) the emission and deposition rates of TCDD from the source, (2) the fractional retention and half-life of fly ash on plants, (3) the environmental half-life of TCDD, (4) the animal feeding and management systems, (5) the bioavailability of TCDD and related compounds, (6) the metabolism and pharmacokinetics of TCDD in farm animals, (7) food consumption levels, (8) the half-life of TCDD in humans, and (9) the model selected to estimate cancer risk. For persons living in the area of highest deposition near an incinerator, a possible uptake of TCDD from foods of animal origin was estimated to be about 10–40 fg/kg·d, which was much greater than the 1–5 fg/kg·d uptake estimated for foods of plant origin. The total uptake of TCDD from foods by the maximally exposed population will usually be about 500- to 1000-fold greater than that due to inhalation. Although milk was assumed to be the most important food pathway in several previous assessments that evaluated the hazards of airborne emissions, we determined that the deposition-forage-cattle-beef pathway was the more important route of exposure. The previous assessments appear to have used inappropriate pharmacokinetic models for TCDD and to have overestimated pasture use for dairy cows. The amount of TCDD accumulated in soil from airborne emissions was found to be less important than the amount deposited in forage, a finding that is the opposite of the usual conclusions drawn for

Journal of Toxicology and Environmental Health, 29:1–43, 1990