applications where specific input data can be used for relatively small fields. Its use in a generic application, and for fairly large waste management units, may overestimate quantities of soil eroded.

- Handling of the Soil Loss Constant - This term is the sum of loss rates for leaching, erosion, runoff, biodegradation, hydrolysis, and volatilization. Possible uncertainties may arise because: the assessment assumes that these terms are first-order decay rates and therefore can be added together; loss processes are calculated independently, even though they may occur simultaneously.
- Use of the Soil Water Content Equation to predict soil water content in a generic application - The equation is from the Superfund Exposure Assessment Manual (U.S. EPA, 1988x), and was developed for site-specific applications.
- Area of garden and agricultural field - No data were available on the size of home gardens, gardens on subsistence farms, or yards of residential lots (for soil ingestion). Therefore, a single set of central tendency and high-end values was estimated for these, based on best professional judgment; this set is referred to as garden area, even though it might also apply to a yard. Because a larger area leads to greater dilution of deposited or eroded contaminant, a high-end garden would be one that was relatively small.
- Areas for agricultural fields were estimated from data in the 1992 Census of Agriculture (U.S. Department of Commerce, 1992). The Census gives average farm acreage by State for 48 States (the data are not yet complete for the two missing States). No percentile data were available. These data do not distinguish between commercial and subsistence farms.
- Mixing Depth—Mixing depth reflects the depth of soil to which deposited or eroded contaminant is mixed. It is important to distinguish between soil that is tilled for agricultural purposes and soil that is untilled in determining appropriate mixing depth values. A smaller mixing depth results in less dilution of a constituent, and therefore higher soil concentrations; therefore, a high-end mixing depth would be smaller than a central tendency mixing depth.

(vii) Surface Water Pathways

Water column as well as benthic sediment concentrations were estimated. Water column concentrations include dissolved, sorbed to suspended sediments, and total (sorbed plus dissolved, or total contaminant divided by total water volume). Benthic sediment concentrations included: Dissolved in pore water, sorbed to benthic sediments, and total. The model accounts for three routes of constituent entry into the water-body were examined: Sorbed to soils eroding into the water-body; dissolved in runoff water; and diffusion of vapor phase contaminants into the water-body. Air deposition of constituents bound to particles into a water-body was not examined because earlier analysis demonstrated that its contribution would be negligible when compared to that of eroding particles. Volatilization of dissolved constituents and removal of constituents through burial in bed sediments were modeled as loss processes.

Important assumptions made for the surface water modeling included: Water-body sufficiently large to support certain ecological receptors; sufficient fish to support a subsistence fisher; uniform mixing within the water-body (this tends to be more realistic for smaller water-bodies as compared to large river systems); and equilibrium is established between constituents within the water column, bed sediments, and air.

The Agency seeks comment on the following issues related to the modeling of surface water pathways:

- Water-body/Watershed Characterization—The water-body characterization parameters are another example of a set of parameters that are interdependent and therefore were used as a group. Watershed characterization relates to the water-body (in the case of the assessment, a stream) characterization. Streams are characterized (flow, water-body area, watershed area, depth, and various other parameters) by their ''order.'' A first-order stream has no tributary channels; a second-order stream forms when two first-order streams converge, and so on through stream order 10. The Agency used a stream order 4 as the high-end estimate because EPA believes this stream order would be among the smallest stream orders that would support sufficient fish or a subsistence fisher and the receptors assessed. A stream order 5 was used as the central-tendency estimate based on the number of streams within each stream order. (See Section 6.8 in the Technical Support Document for the Hazardous Waste Identification Rule: Risk Assessment for Human and Ecological Receptors for more detail.)
- Total Suspended Solids—Total suspended solids (TSS) can range from 1 to 100 mg/L with a typical value being 10 mg/L for streams and rivers. This value is used as the central tendency value. No data on frequency of values in actual streams was available to estimate a 90th percentile value. Since 80 mg/L is believed to be the maximum tolerable value for aquatic life; this value was used as the high-end value.
- Bed Sediment Concentration—The bed sediment concentration term is analogous to the bulk density for soil in that it describes the concentration of solids in terms of a mass per unit volume. A single value of 1 kg/L was used in the assessment given that this is considered a reasonable value in most situations and the range is quite narrow, 0.5 to 1.5 kg/L.
- Gas-Phase Transfer Coefficient—The gas-phase transfer coefficient is used to estimate volatile losses from the water-body. Volatile losses are calculated using a two-layer resistance model that incorporates a gas-phase transfer coefficient and a liquid-phase transfer coefficient. Both transfer coefficients are controlled by flow induced turbulence in flowing systems. The liquid-phase transfer coefficient is calculated based on chemical-specific properties. A single value of 36,500 m/yr. was used. There is some uncertainty related to setting this parameter to a single value that is not chemical specific. It is reasonable to assume that chemical properties affecting volatility would have some effect on this value, although it is not known how large such an effect would be.
- Fraction Organic Carbon in Bottom Sediment—The fraction organic carbon in bottom sediment is derived from the fraction organic carbon in watershed soils. For a fraction organic carbon of about 0.01 in the watershed, the fraction organic carbon for bottom sediments is typically 0.03 to 0.05. The midpoint of this range, 0.04, divided by the fraction organic carbon of the watershed (0.01) derives a multiplier of 4 for calculating fraction organic carbon in bottom sediments from fraction organic carbon in watershed soils. The fraction organic carbon values used of 0.024 and 0.008 correspond to the central tendency and high-end values for soil fraction organic carbon of 0.006 and 0.002, respectively. The fraction organic carbon in the bottom sediments was varied with the fraction organic carbon in soil.

(viii) Food-Chain Pathways

The Agency seeks comment on the following issues related to the modeling of food-chain pathways: (Please note the fish uptake methodology is described below in Section D.2.c.2), Ecological Receptors and Exposure; the littoral methodology is used for humans):