Commission and U.S. Department of Energy), the Agency is considering using 1,000 years as an alternative time horizon. The Agency requests comment on this issue which is described in more detail below.

Using this shorter time horizon results in an increase of the leachate concentration limit for a number of constituents. The constituents affected are those which are strongly sorbed in the subsurface, and which therefore tend to migrate slowly. These constituents include organics with retardation factors (R) significantly greater than one. The organic carbon partition coefficient (k_{oc}) values for these constituents are about 3,500 g/cm^3 or greater, and certain metals such as lead and chromium(III). For organic constituents with k_{oc} values less than about 3,500 g/cm^3, the highest receptor well exposure concentration is generally reached in less than 1,000 years. Reducing the modeling time horizon from 10,000 to 1,000 years therefore does not affect the results of the pathway analysis for these constituents. The effect of using a 1,000 year versus a 10,000 year time horizon is illustrated in Table 4. The constituent-specific differences are shown in Table B–1 of appendix B to the preamble. The table is based on a landfill waste management scenario, and all constituents are assumed to have identical toxicity values and not be subject to hydrolysis. For reference, the leachate concentration limit for constituents with k_{oc}=0 (no sorption, R=1), and a 10,000 year time horizon is equal to 1.0 mg/L. This table shows that the increase in leachate concentration limit for organic constituents is affected for a shorter modeling horizon (1,000 years) only when k_{oc} values (or R values) are very large. (About fifteen percent, out of a total of approximately 200, including eight metals, fall into this category.) The effect of hydrolysis rate is not considered in results shown in the table. While hydrolysis influences the magnitude of the exposure concentration at a receptor well, the time that it takes for a contaminant to reach the receptor well is independent from the chemical-specific hydrolysis rate. It is, however, strongly influenced by chemical-specific sorption characteristics, which for organics are expressed in terms of k_{oc} or R values.

TABLE 4.—EFFECT OF 1,000 YEAR VERSUS 10,000 YEAR MODELING TIME HORIZON ON LEACHATE CONCENTRATION LIMIT

k_{oc} (cm^3/)	10,000 years	1,000 years
0.0	1.0	1.0
3,384 (R=10)	1.0	1.0
37,224 (R=100).	1.0	60

(2) Implementation of Parameter Bounds in Monte Carlo Procedure

The Monte Carlo modeling procedure used in the groundwater pathway analysis uses data on waste site location from the EPA's Industrial Subtitle D Survey (USEPA, 1986). These data are combined with other data sets for climatic and hydrogeological parameters. Auxiliary parameters for which no direct data is available are calculated internally in the model. For instance, ground-water velocity is calculated from hydraulic conductivity, gradient and effective porosity, and the dispersivity is calculated from the receptor well distance (See EPACMTP Background Document and User's Manual). Each parameter furthermore can have specified upper and lower bounds to guard against the possibility that physically infeasible parameters and/or parameter combinations are not used. When the latter condition occurs, the particular Monte Carlo realization is rejected, and another realization is generated. The Agency is considering an alternative procedure in which only the offending parameter is regenerated, or, if necessary, set equal to its upper or lower bound to avoid selection of values beyond the minimum to the maximum values range. In first case, the frequency distribution of parameter values generated by the Monte Carlo module, may be different from its input distribution. The Agency has determined that the two alternative procedures have little impact on the overall modeling results in the case of landfills and land application units, but that the default procedure tends to favor the selection of sites with larger waste unit area in the case of waste piles and surface impoundments. Therefore it produces more conservative (lower) values for the final leachate concentration limits. The analysis results show that for the two alternative Monte Carlo procedures for surface impoundments, the default procedure results in a leachate concentration limit of 1.0 mg/L, the alternative procedure results in a concentration limit of about 31 mg/L for a chemical with R=1. The effect of changes in the hydrolysis rate or the R value on the resultant regulatory leachate concentration do not impact the results obtained by using the alternative Monte Carlo procedure described in this subsection. The Agency is also soliciting comments on the Monte Carlo parameter rejection procedure used for the results presented in this subsection.

(3) Hydraulic Conductivity of Surface Impoundment Bottom Layer

The surface impoundment scenario modeled in the groundwater pathway analysis incorporates a 2 feet thick layer at the base of the impoundment. In the base case for this proposal, the layer is assigned a hydraulic conductivity of 10–7 cm/sec. The Agency recognizes that this value may or may not be appropriate value for bottom sediments as a nationwide typical for industrial Subtitle D surface impoundments. To evaluate the impact of varying this parameter, the Agency has compared modeling results obtained using a 10 times higher conductivity of 10–6 cm/sec. A higher conductivity value corresponds to a greater leachate flux from the impoundment, and generally higher receptor well concentrations, which translates into a more conservative (lower) regulatory leachate concentration limit. The regulatory limit calculated for a conductivity value of 10^{-7} cm/sec is 1.0 mg/L, the corresponding value for a conductivity of 10^{-6} cm/sec would be 0.35 mg/L. The effect of changes in hydraulic conductivity on the results is believed to be independent of the sorption or the hydrolysis characteristics of the chemical. The Agency is inviting comments on the appropriate value for the hydraulic conductivity of the bottom sediment layer for industrial D surface impoundments. In addition, the Agency requests the submission of hydraulic conductivity data for industrial Subtitle D surface impoundment bottom sludges.

(4) Waste Pile Infiltration Rates

The Agency used the HELP model to calculate the net infiltration rate for landfills, land application units and waste piles, as a function of regional climatic conditions and waste unit design characteristics (see EPACMTP background Document). For waste piles, the Agency considered two alternatives. The procedure used in the base case considered a waste pile, for the purpose of estimating infiltration rates, to be similar to an uncovered landfill. The Monte Carlo modeling analysis therefore used landfill infiltration rates corresponding to the most permeable (sandy loam) of the three cover types