

performance modeling might indicate that sites with lower rainfall and deeper ground-water tables perform significantly better with respect to limiting off-site doses from radionuclides that can be transported away from the disposal cells by infiltrating ground water. Such a result would not be surprising, simply because the travel time for radionuclides to produce an off-site dose to individuals is likely to be longer if infiltration is less and it takes longer to reach ground water in the first place. For these "dry" sites, higher waste concentrations for those radionuclides readily transported with ground water could apply to the disposal facility while still meeting the same exposure limits as the "wet" sites (with higher rainfall and shallower ground-water tables). For both options, the exposure limits which underlie the rule would be the same. If site conditions leading to superior overall performance were clearly seen in the modeling, Option 2 would take advantage of that projected performance, whereas Option 1 would not.

Should Option 2 prove preferable, we would then face the challenge of defining desirable site conditions that would allow disposal of waste with higher radionuclide concentrations in some subset of RCRA-C facilities. In general, annual precipitation is an important parameter (and is also one for which data can be obtained easily), but often varies too much to be used by itself to characterize site behavior. Experience in modeling the movement of radionuclides through the environment, as well as empirical observation, indicate that the depth from the bottom of the disposal cell to the ground water is another important parameter that also is measured easily. Although depth to ground water also can vary (e.g., with seasonal variation in precipitation), we believe that it could be possible to use precipitation and depth to ground water, in combination with other parameters, to distinguish sites that can accept higher concentrations of some radionuclides without presenting undue hazards to human health and the environment. This approach essentially favors sites that have long travel times from the disposal cell to the ground-water table (generally through some combination of deep ground water and soil types that tend to slow the movement of infiltrating water) and limited infiltration of water through the cap to the waste layer (generally through a combination of low precipitation and high evapotranspiration).

We recognize that there are many other parameters that affect radionuclide transport. However, it may be difficult to obtain the necessary information, and necessarily more complex to devise a method to combine the parameters. We encourage public comment on the concept of distinguishing among sites, as well as ideas on methods to make that distinction. As an initial point of review for interested commenters, we have examined this issue for relatively small Subtitle D facilities in remote locations. Because many of these facilities are in communities with limited resources, we determined that ground-water monitoring could be limited if annual precipitation (including evapotranspiration) was less than roughly 25 inches, as long as there is no evidence of ground-water contamination. We also developed a screening tool for Subtitle D facilities seeking no-migration variances that considers precipitation, depth to ground water, net infiltration, evapotranspiration potential, and permeability of the unsaturated zone. This approach implicitly estimates travel time from the disposal cell to the ground water. See "Preparing No-Migration Demonstrations for Municipal Solid Waste Disposal Facilities: A Screening Tool," EPA530-R-99-008, February 1999 (available at <http://www.epa.gov/osw>).

We are aware that the approach embodied in Option 2 is somewhat different from that taken by existing RCRA regulations. RCRA is a national program and we have written regulations accordingly. In practice, this means that all members of the regulated community have to meet the same standard, whether it is numeric or technological (i.e., a site with "good" transport characteristics does not get to accept higher concentrations of hazardous constituents than sites with relatively poorer characteristics). Under certain conditions, the standard may be adjusted to meet the regulated party's specific circumstances (e.g., through a delisting petition or variance). In these cases, we create a process that an applicant can use to justify an alternative standard. This would be somewhat analogous to allowing a disposal facility operator to calculate site-specific concentration limits, as we discussed earlier in this section.

Another option would be to set other restrictions on site characteristics for RCRA-permitted landfills accepting low-activity mixed waste for disposal. We believe the modeling should be conducted with the intent that any facility that could be sited and

permitted under RCRA Subtitle C could safely dispose of LAMW. However, some commenters may believe that some locations would not be appropriate for radionuclide disposal without additional conditions or site-specific analysis, especially if these locations have relatively poor overall transport characteristics or geologic features such as fractures in the subsurface that might provide faster transport pathways to the ground water. If we were to identify such criteria that go beyond the existing RCRA criteria (i.e., if simply having a RCRA permit is not sufficient), what should they be? If a site did not meet the basic eligibility criteria, should there be an alternative "qualification" process (e.g., through the type of site-specific analysis discussed earlier in this section)? For purposes of an implementable standard, the basic eligibility criteria would need to be clearly defined in the rule itself (NRC may or may not require additional conditions or restrictions on waste streams under its authority before RCRA-C facilities could accept those wastes). We also would need to clearly relate these specific characteristics to a performance objective. Therefore, we also ask that commenters provide supporting technical or scientific information that describes how their recommendations would improve facility performance, and how they would define "good" performance. The criteria could include climatological characteristics such as annual precipitation, transport characteristics of the unsaturated zone, depth to ground water, or proximity to other features that affect site suitability. These minimum criteria then would be factored into the basis for deriving radionuclide concentrations from off-site exposures.

We also note that RCRA authorized States can issue standards that are more stringent than the national program. This means that some States could already have siting criteria for RCRA facilities that explicitly address some of the factors mentioned above. We would welcome comments that identify such criteria and indicate the technical and scientific basis for their adoption. As we have stated before, we believe that the modeling should be sufficiently conservative to account for reasonably anticipated variations in site performance, so that special conditions would not be necessary.

iii. Modeling Timeframe. Another factor in modeling the long-term performance of a disposal cell is the time period covered by the modeling. We believe that a 1,000 year modeling period may be appropriate, although we