examined three options. The first option, the mean CCDF or expected value, was selected because of its ability to convey a sense of the whole ensemble of CCDFs generated. In calculating the mean, all CCDFs—those representing best case results, those representing worst case results, and everything in between—are included. Since it cannot be known which CCDF represents actual performance over the 10,000 year regulatory period, it is deemed wise to include the influence of all generated CCDFs.

The Agency also examined the median CCDF. The median CCDF would be indicative of the central tendency of the majority of the CCDFs and would not exhibit the influence of high or low consequence CCDFs as strongly as the mean CCDF. Specifically, the influence of high consequence CCDFs that do not meet the requirements of section 13(a) of 40 CFR part 191 would be discounted by the median. In the Agency's view, this makes the median CCDF less suitable as a compliance indicator.

The Agency also examined the possibility of using a percentile value as a compliance indicator. The Agency has considered and rejected percentile values at or below 50 on grounds that such values would not provide adequate confidence of achieving the desired protection of public health. As for higher values, the Agency believes that it would be extremely difficult to justify any specific higher value.

The Agency solicits comment on the appropriateness of the mean or some other CCDF as a basis for compliance. The Agency solicits comments on using some possible combination of CCDFs as a basis for compliance; e.g., requiring that the mean and the median meet the requirements of section 13(a) of 40 CFR part 191.

Another issue upon which the Agency solicits comment is on the alternative of basing compliance on one single realization, rather than on a multitude of them as discussed above and then using that realization to determine compliance with the containment requirements. Instead of sampling from a given range of variables for each parameter and generating a new realization curve each time this is done, it has been suggested that all possible values for each parameter should be selected in creating a single curve. In this way, all the information is folded into one realization which either complies or does not. The advantage in this technique is that the issue of the appropriateness of the mean, median, or other percentile is obviated. The disadvantage is that it is difficult to see

exactly which parameters caused the curve to behave in a particular way.

Regardless of the method ultimately used to determine compliance with the numerical requirements of section 13 of 40 CFR part 191, a "reasonable expectation of compliance" with the containment requirements cannot be achieved until a demonstration has been made that the qualitative requirements set forth in sections 21 through 27 of today's proposal have also been met. A "reasonable expectation of compliance" with the containment requirements shall not be based solely upon a statistical estimate of radionuclide releases to the accessible environment. Instead, the Agency will consider the full record of information submitted in compliance applications and will examine the methods and assumptions which were used to support the development of radionuclide release estimates. For example, the EPA will consider such factors as the reasonableness of the processes and events incorporated into performance assessments, the appropriateness of any expert elicitation used to provide input to models, the adequacy of peer review, and the quality of other data inputs. Only after a demonstration has been made that all of the requirements set forth in sections 21 through 27 of today's proposal have been met and that the numerical requirements of section 13 of 40 CFR part 191 have been satisfied, will a "reasonable expectation" of compliance with the containment requirements be achieved.

Assurance Requirements

In addition to the numerical requirements set forth in the Agency's radioactive waste disposal standards, section 14 of the standards contains a set of qualitative requirements to help assure that the desired level of protection is achieved. These assurance requirements address: (1) Active institutional controls; (2) monitoring; (3) passive institutional controls; (4) engineered barriers; (5) consideration of the presence of resources; and (6) removal of waste.

Active Institutional Controls

According to the disposal standards:

Active institutional controls over disposal sites should be maintained for as long a period of time as is practicable after disposal; however, performance assessments that assess the isolation of the wastes from the accessible environment shall not consider any contributions from active institutional controls for more than 100 years after disposal.

As defined in 40 CFR part 191, "active institutional control" means:

"(1) Controlling access to a disposal site by any means other than passive institutional controls; (2) performing maintenance operations or remedial actions at a site; (3) controlling or cleaning up releases from a site; or (4) monitoring parameters related to disposal system performance."

With the above requirements in mind, today's proposal requires that any application for certification of compliance contain detailed descriptions of proposed active institutional controls, their location and the period of time they are proposed to remain active. Any credit assumed for reduced human activity in the vicinity of the WIPP or reduced releases of radionuclides must be supported by such descriptions but, as indicated in the disposal standards, in no case shall it be assumed that active institutional controls will be effective in preventing or reducing releases beyond 100 years after disposal.

Monitoring

Since the predictions associated with long-term compliance with the disposal standards of 40 CFR part 191 are inherently uncertain, final disposal standards issued in 1985 included a provision requiring monitoring of disposal systems to help assure that they are performing as predicted. The proposed disposal standards issued in 1982 had not included such a requirement. However, several commenters (including most of the States) urged addition of a requirement for long-term monitoring of a repository after disposal to guard against unexpected failures. Accordingly, further information was sought on this idea. The Agency surveyed the capabilities and expectations of longterm monitoring approaches. As explained in the preamble to the 1985 disposal standards (50 FR 38081, September 19, 1985):

Evaluating this information led the Agency to several conclusions:

(1) Perhaps most importantly, the techniques used for monitoring after disposal must not jeopardize the long-term isolation capabilities of the disposal system. Furthermore, plans to conduct monitoring after disposal should never become an excuse to relax the care with which systems to isolate these wastes must be selected, designed, constructed, and operated.

(2) Monitoring for radionuclide releases to the accessible environment is not likely to be productive. Even a poorly performing geologic repository is very unlikely to allow measurable releases to the accessible environment for several hundreds of years or more, particularly in view of the engineered controls needed to comply with 10 CFR Part 60. A monitoring system based only on