§ 63.304 Reasonable expectation.  

Reasonable expectation means that the Commission is satisfied that compliance will be achieved based upon the full record before it. Characteristics of reasonable expectation include that it:  
(1) Requires less than absolute proof because absolute proof is impossible to attain for disposal due to the uncertainty of projecting long-term performance;  
(2) Accounts for the inherently greater uncertainties in making long-term projections of the performance of the Yucca Mountain disposal system;  
(3) Does not exclude important parameters from assessments and analyses simply because they are difficult to precisely quantify to a high degree of confidence; and  
(4) Focuses performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

§ 63.305 Required characteristics of the reference biosphere.

(a) Features, events, and processes that describe the reference biosphere must be consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site.  
(b) DOE should not project changes in society, the biosphere (other than climate), human biology, or increases or decreases of human knowledge or technology. In all analyses done to demonstrate compliance with this part, DOE must assume that all of those factors remain constant as they are at the time of submission of the license application.

(c) DOE must vary factors related to the geology, hydrology, and climate based upon cautious, but reasonable assumptions of the changes in these factors that could affect the Yucca Mountain disposal system during the period of geologic stability, consistent with the requirements for performance assessments specified at §63.342.  
(d) Biosphere pathways must be consistent with arid or semi-arid conditions.

§ 63.310 Required characteristics of the reasonably maximally exposed individual.  

The reasonably maximally exposed individual is a hypothetical person who meets the following criteria:  
(a) Lives in the accessible environment above the highest concentration of radionuclides in the plume of contamination;  
(b) Has a diet and living style representative of the people who now reside in the Town of Amargosa Valley, Nevada. DOE must use projections...
§ 63.321 Individual protection standard for human intrusion.

(a) DOE must determine the earliest time after disposal that the waste package would degrade sufficiently that a human intrusion (see §63.322) could occur without recognition by the drillers.

(b) DOE must demonstrate that there is a reasonable expectation that the reasonably maximally exposed individual receives, as a result of the human intrusion, no more than the following annual dose:

1. 0.15 mSv (15 mrem) for 10,000 years following disposal; and
2. 1.0 mSv (100 mrem) after 10,000 years, but within the period of geologic stability.

(c) DOE’s analysis must include all potential environmental pathways of radionuclide transport and exposure, subject to the requirements of §63.322.

[74 FR 10829, Mar. 13, 2009]

§ 63.322 Human intrusion scenario.

For the purposes of the analysis of human intrusion, DOE must make the following assumptions:

(a) There is a single human intrusion as a result of exploratory drilling for ground water;

(b) The intruders drill a borehole directly through a degraded waste package into the uppermost aquifer underlying the Yucca Mountain repository;

(c) The drillers use the common techniques and practices that are currently employed in exploratory drilling for ground water in the region surrounding Yucca Mountain;

(d) Careful sealing of the borehole does not occur, instead natural degradation processes gradually modify the borehole;

(e) No particulate waste material falls into the borehole;

(f) The exposure scenario includes only those radionuclides transported to the saturated zone by water (e.g., water enters the waste package, releases radionuclides, and transports radionuclides by way of the borehole to the saturated zone); and

(g) No releases are included which are caused by unlikely natural processes and events.

§ 63.331 Separate standards for protection of ground water.

DOE must demonstrate that there is a reasonable expectation that, for 10,000 years of undisturbed performance after disposal, releases of radionuclides from waste in the Yucca Mountain disposal system into the accessible environment will not cause the level of radioactivity in the representative volume of ground water to exceed the limits in the following Table 1:

<table>
<thead>
<tr>
<th>Radionuclide or type of radiation emitted</th>
<th>Limit</th>
<th>Is natural background included?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined radium-226 and radium-228</td>
<td>5 picocuries per liter</td>
<td>Yes.</td>
</tr>
<tr>
<td>(excluding radon and uranium).</td>
<td>15 picocuries per liter</td>
<td>Yes.</td>
</tr>
<tr>
<td>Combined beta and photon emitting radionuclides</td>
<td>0.04 mSv (4 mrem) per year to the whole body or any organ, based on drinking 2 liters of water per day from the representative volume.</td>
<td>No.</td>
</tr>
</tbody>
</table>