

prescribed regulatory criteria, and a description of the factors that make these situations unlikely.

(8) A description and prioritization of the isolation features that are considered important to keep releases and doses within regulatory limits and as low as is reasonably achievable.

(9) Documentation of where the major uncertainties lie in the total system performance assessment and how the applicant will mitigate such uncertainties.

(10) Documentation of a sensitivity case where engineered barriers are rendered ineffective, individually and collectively.

(11) Presentation of the key features and results for each material subscenario in the repository system.

(12) A comparison of and rebuttal to results of any scientific peer review of the applicant's total system performance assessment and/or its underlying science performed by the Nuclear Waste Technical Review Board, the International Atomic Energy Agency, or other peer reviewer designated by the applicant or the Commission.

(d) *Potentially disqualifying conditions.* The following conditions are to be considered adverse and potentially disqualifying if they are characteristic of the post-closure controlled area at Yucca Mountain or may materially affect isolation within the controlled area. The application shall demonstrate that these disqualifying conditions do not exist or, if they do exist, that they are not materially adverse to the long-term safety of the repository.

(1) Potential for flooding of the underground facility.

(2) Potential for natural phenomena such as subsidence or volcanic activity of such a magnitude that large-scale surface water impoundments could be created that could change the regional groundwater flow system and thereby adversely affect the performance of the repository.

(3) Structural deformation, such as uplift, subsidence, folding, or faulting that may adversely affect the regional groundwater flow system.

(4) Potential for changes in hydrogeologic conditions that would affect the migration of radionuclides to the accessible environment, such as changes in hydraulic gradient, average interstitial velocity, storage coefficient, hydraulic conductivity, natural recharge, potentiometric levels, and discharge points.

(5) Potential for changes in hydrologic conditions resulting from reasonably foreseeable climatic changes.

(6) Groundwater conditions in the host rock, including chemical composition, high ionic strength or ranges of Eh-pH, that could increase the solubility or chemical reactivity of the engineered barrier system.

(7) Geochemical processes that would reduce sorption of radionuclides, result in degradation of the rock strength, or adversely affect the performance of the engineered barrier system.

(8) Groundwater conditions in the host rock that are not reducing.

(9) Evidence of dissolution such as breccia pipes, dissolution cavities, or brine pockets.

(10) Structural deformation such as uplift, subsidence, folding, and faulting during the Quaternary Period.

(11) Earthquakes that have occurred historically that if they were to be repeated could affect the site significantly.

(12) Indications, based on correlations of earthquakes with tectonic processes and features, that either the frequency of occurrence or magnitude of earthquakes may increase.

(13) More frequent occurrence of earthquakes or earthquakes of higher magnitude than is typical of the area in which the geologic setting is located.

(14) Evidence of igneous activity since the start of the Quaternary Period.

(15) Evidence of extreme erosion during the Quaternary Period.

(16) The presence of naturally occurring materials, whether identified or undiscovered, within the site, in such form that:

(i) Economic extraction is currently feasible or potentially feasible during the foreseeable future; or

(ii) Such materials have greater gross value or net value than the average for other areas or similar size that are representative of and located within the geologic setting.

(17) Rock or groundwater conditions that would require complex engineering measures in the design and construction of the underground facility or in the sealing of boreholes and shafts.

(18) Geomechanical properties that do not permit design of underground opening that will remain stable through permanent closure.

(19) Potential for the water table to rise sufficiently so as to cause saturation of an underground facility located in the unsaturated zone.

(20) Potential for existing or future perched water bodies that may saturate portions of the underground facility or provide a faster flow path from an underground facility located in the unsaturated zone to the accessible environment.

(21) Potential for the movement of radionuclides in a gaseous state through air-filled pore spaces of an unsaturated geologic medium to the accessible environment.

Petition at 40–43.

3. Section 63.113 *Performance Objectives for the Geologic Repository After Permanent Closure*

Petitioner requests that new paragraphs (e) and (f) be added to this section, as follows:

(e) *Geologic Setting.* The geologic setting for the Yucca Mountain repository shall evidence a pre-waste-emplacement groundwater travel time along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment of at least 1,000 years.

(f) *Peak Dose.* The geologic setting for the Yucca Mountain repository shall evidence sufficient geologic suitability to provide reasonable assurance that peak radiation doses to the accessible environment will not occur subsequent to the regulatory monitoring period established by the

Environmental Protection Agency in 40 CFR Part 197.

Petition at 43.

4. Section 63.115 *Requirements for Multiple Barriers*

Petitioner requests that a new paragraph (d) be added to this section, as follows:

(d) The natural features of the geologic setting shall constitute the primary barrier for assuring the long-term isolation of high-level radioactive waste and spent nuclear fuel at the proposed geologic repository at Yucca Mountain.

Petition at 44.

5. Section 63.311 *Individual Protection Standard After Permanent Closure*

Petitioner requests that the words “a reasonable expectation” in this section be replaced with the words “reasonable assurance” so that it reads as follows:

DOE must demonstrate, using performance assessment, that there is reasonable assurance that, for 10,000 years following disposal, the reasonably maximally exposed individual receives no more than an annual dose of 0.15 mSv (15 mrem) from releases from the undisturbed Yucca Mountain disposal system. DOE's analysis must include all potential pathways of radionuclide transport and exposure.

In addition, petitioner requests that § 63.304, providing a definition of “reasonable expectation,” be deleted in its entirety.

Supporting Information

Petitioner believes that the present Part 63 rule is “materially deficient” for two reasons: (1) it “does not now provide the regulatory framework to assure that the repository isolates [HLW] over the long term primarily by geologic means;” and (2) it “does not demand of the applicant that it provide an affirmative safety case for the repository.” Petition at 4. Lacking these two “fundamental prerequisites,” Part 63, in petitioner's view, “fails to assure the long-term safety of the repository or its compliance with the statutory requirements of the NWP.” *Id.* Petitioner identifies five basic elements to be added to Part 63: (1) Provisions ensuring that geologic isolation is the primary barrier against the release of radiological contamination to the environment, (2) provisions requiring the submission of an affirmative safety case, (3) provisions requiring the verification of the lack of materially adverse or potentially disqualifying conditions for Yucca Mountain following closure of the repository, and (4) provisions relating to the provision of “reasonable assurance” of the safety of the repository. Petition at 39.