

Summary of 40 CFR Part 197
Prepared for the
Blue Ribbon Commission on America's Nuclear Future

Title: Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV

Issued and Amended: Pursuant to the Energy Policy Act of 1992 (Section 801(a)(1))

NAS Report (Technical Bases for Yucca Mountain Standards, 1995)

As directed by statute, EPA contracted with the National Academy of Sciences for a study on reasonable standards for protection of public health and safety at Yucca Mountain. EPA's standards were required to be "based upon and consistent with" the findings and recommendations of the NAS. The NAS recommendations included:

- Use of an individual-protection standard based on risk
- Application of a compliance standard at the time of maximum risk, within the period of geologic stability of the site (estimated to be "on the order of" 1 million years).
- Use of a critical-group approach in assessing exposures to individuals
- Use of a "stylized" scenario to assess the effects of human intrusion

Proposed Rule (64 FR 46976, August 27, 1999)

EPA proposed disposal standards consisting of three primary elements applicable in the accessible environment (i.e., outside the controlled area defined as part of the disposal system):

- *Individual-protection standard* limiting annual doses to the Reasonably Maximally Exposed Individual (RMEI)
 - RMEI is a hypothetical person representative of the current population and lifestyle in the Town of Amargosa Valley
- *Human-Intrusion standard* to evaluate effects of a drilling scenario
 - Single penetration using current water drilling technology
- *Ground-water protection standards* applying concentration limits
 - limits consistent with Safe Drinking Water Act standards for drinking water
 - assess compliance in a "representative volume" of ground water
 - two methods of compliance determination proposed

A compliance period of 10,000 years was proposed for all standards, although projected doses for the individual-protection and human-intrusion standard were required through the time of peak dose. The Department of Energy was directed to place these projections in its Environmental Impact Statement. This approach addressed EPA's concerns regarding the increased uncertainty in projecting and interpreting doses beyond 10,000 years, while also taking into account the NAS recommendation that the performance assessment capture the peak dose. Uncertainty in modeling performance was also assessed by application of EPA's "reasonable expectation" standard for regulatory judgments of compliance.

Final Rule (66 FR 32074, June 13, 2001)

EPA's final disposal standards retained the three primary protection standards in the proposal. For purposes of assessing compliance, EPA defined the controlled area as encompassing an area no larger than 300 square kilometers and extending no farther from the repository than 5 km in

any direction, except that in the predominant direction of ground-water flow (south) the controlled area may extend as far as the southwestern corner of the Nevada Test Site (roughly 18 km). EPA based this decision on an evaluation of historic, current, and reasonably foreseeable population patterns and development plans, as well as the economic and technical feasibility of accessing ground water in the area of the repository.

D.C. Circuit Court of Appeals Ruling (NEI v EPA, 373 F.3rd 1251, July 9, 2004)

The D.C. Circuit vacated EPA's disposal standards to the extent that they incorporated a 10,000-year compliance period (licensing requirements of the Nuclear Regulatory Commission in 10 CFR part 63 were vacated to the same extent). Specifically, the Court ruled that the 10,000-year compliance period was not "based upon and consistent with" the recommendation of the NAS that compliance be assessed at the time of maximum risk, within the period of geologic stability of the site. The Court found that EPA's policy decision citing uncertainty in dose projections as a rationale for establishing a shorter compliance period, and placing peak dose projections in the EIS, was not a sufficient basis for inconsistency with the NAS recommendation.

The D.C. Circuit denied challenges to the definition of the controlled area and to EPA's authority to establish ground-water standards under the Energy Policy Act. On this latter point, the Court ruled that EPA's ground-water protection policies provided a rational basis for establishment of standards to protect the ground water as a resource, notwithstanding the NAS finding that such standards were not necessary to limit risks to individuals.

Proposed Amendments (70 FR 49014, August 22, 2005)

EPA's proposed amendments to address the D.C. Circuit ruling focused on extending the compliance period to 1 million years, consistent with the NAS estimate of the time that the geologic environment would be sufficiently stable to allow it to be modeled. Specifically, EPA proposed:

- To retain the dose standard applicable for the first 10,000 years (15 mrem/yr);
- To establish a separate dose standard for the period beyond 10,000 years and up to 1 million years, based on considerations of the variation in natural background radiation in the United States (350 mrem/yr);
- To assess compliance based on the arithmetic mean of the distribution of projected doses for the first 10,000 years, and on the median of the distribution thereafter;
- To specify the evaluation of seismic, igneous, climatic, and corrosion events and processes for the period beyond 10,000 years; and
- Not to extend the compliance period for the ground-water protection standards, consistent with the D.C. Circuit finding that these standards were not addressed by NAS.

Final Amendments (73 FR 61256, October 15, 2008)

EPA's final amended disposal standards retained the elements of the proposed amendments. However, EPA adjusted the level of the post-10,000-year dose standard to be consistent with annual public dose limits recommended by the International Commission on Radiological Protection and adopted by the NRC (100 mrem/yr). EPA's final standards also specified that the arithmetic mean of the distribution of projected doses would be used to assess compliance with the post-10,000-year standard. NRC was given responsibility for specifying future climate parameters and evaluating the significance of certain seismic effects.