

Regulatory History
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Overview. The Nuclear Waste Policy Act of 1982 divides responsibilities for repository regulation among three agencies: (1) the Environmental Protection Agency (EPA) issues "generally applicable standards for protection of the general environment from offsite releases from radioactive material in repositories;" (2) the Nuclear Regulatory Commission (NRC) issues technical requirements and criteria for use in licensing repositories, to be "not inconsistent" with the EPA standards; and (3) DOE issues general guidelines for recommending sites for repositories based on criteria identified in the Act. Despite deadlines established in the Act, litigation and legislative intervention caused major delays and reversals in the regulatory development process, requiring repository developers to work for extended periods without clear guidance about repository performance standards. As a result of this history, the U.S. now has two significantly different sets of repository regulations -- one applicable only at Yucca Mountain and the other applicable everywhere else. The differences between them are sufficient that revised regulations may be required for a new repository development process.

Initial steps. In 1985 EPA issued generic regulation (40 CFR 191) for repositories for high-level and transuranic waste. They established "containment" requirements to protect populations through first-of-a-kind quantitative limits on the probabilities of releases of specified amounts of radioactive materials to the environment over a 10,000 year period, rather than limiting radiation doses or health effects to individuals. Recognizing that complete assurance that these requirements have been met is impossible, EPA required only a "reasonable expectation" of compliance. To protect individuals living near the repository, 40 CFR 191 includes a 25 millirem/year maximum radiation dose to individual members of the public, and numeric limits on the radionuclide concentrations in nearby irreplaceable sources of groundwater, both applicable for the first 1000 years after disposal. NRC's regulations (10 CFR 60) supplemented EPA's standard with quantitative performance goals for individual barriers in the repository system - waste package, the overall engineered barrier system, and groundwater travel time - as a way to compensate for calculational uncertainties inherent in showing compliance with the overall EPA system performance goal. NRC also specified favorable and potentially adverse site conditions that were to be evaluated, reflected in DOE's siting guidelines (10CFR960).

WIPP/Yucca Mountain split. A federal court remanded 40 CFR 191 in 1987 due in part to inconsistencies between the 10,000 year containment period and the 1,000 year period for the individual protection and groundwater requirements. When the issues had not been settled by 1992, Congress acted to resolve the impasse through (1) the Energy Policy Act of 1992 (EPAct) directing EPA to issue a site-specific dose-based standard for Yucca Mountain, based on recommendations from the National Academy of Sciences (NAS), and (2) the WIPP Land Withdrawal Act directing EPA to finalize a revision of 40 CFR 191 applicable to WIPP and repositories other than Yucca Mountain, act as the determining agency for WIPP's compliance, and recertify compliance every 5 years. EPA reissued 40 CFR 191 in 1993, with a 15 millirem individual protection standard and 10,000 year periods for both the individual protection and groundwater standards, issued implementation guidance for WIPP (40 CFR 194) in 1994, certified WIPP's compliance in 1998, recertified it in 2006, and is now considering DOE's application for the next 5-year recertification.

Yucca Mountain standards. In 1995 the NAS recommended a risk (not dose) standard for Yucca Mountain applied at the time of peak dose (within the limits of geologic stability, on the order of one million years at Yucca Mountain), found individual barrier requirements (as in 10 CFR 60) to be unnecessary and possibly counterproductive, and recommended probabilistic performance assessment as

the principal tool for compliance assessment. In 2001, EPA issued 40 CFR 197 retaining the 10,000 year individual dose limit and compliance period of 40 CFR 191 while requiring DOE to present calculations of the peak dose in the repository Environmental Impact Statement. NRC issued 10 CFR 63 to implement EPA's regulation, focusing on demonstration of total system performance and replacing 10 CFR 60's quantitative individual barrier requirements with a requirement to demonstrate the existence of multiple barriers, based on advances in performance assessment since 10 CFR 60 was developed that NRC believed made the specific barrier requirements unnecessary. DOE issued new siting guidelines for Yucca Mountain (10 CFR 963) to reflect the new regulations' focus on total system performance rather than characteristics of individual barriers as the criterion for suitability. 40 CFR 197 was remanded by federal court in 2004 because of inconsistency with the NAS recommendation to regulate to the time of peak dose. It was reissued in 2008 (along with a conforming revision of NRC's 10 CFR 63), retaining the 15 millirem limit for the first 10,000 years and adding a limit of 100 millirem for the remaining period to one million years. These standards are not applicable to repositories at other sites.