

**NUCLEAR REGULATORY COMMISSION**

**10 CFR Part 50**

**[Docket No. PRM-50-74]**

**Nuclear Energy Institute; Receipt of Petition for Rulemaking**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Petition for rulemaking; Notice of receipt.

**SUMMARY:** The Nuclear Regulatory Commission (NRC) is publishing for public comment a notice of receipt of a petition for rulemaking, dated September 6, 2001, which was filed with the Commission by the Nuclear Energy Institute (NEI). The petition was docketed by the NRC on September 11, 2001, and has been assigned Docket No. PRM-50-74. The petition requests that the NRC amend its regulations regarding Emergency Core Cooling System (ECCS) Evaluation Models to allow licensees to voluntarily adopt the most current industry consensus standard for decay heat power, as well as any subsequent NRC-endorsed revisions to this standard.

**DATES:** Submit comments by December 26, 2001. Comments received after this date will be considered if it is practical to do so, but assurance of consideration can only be given to comments received on or before this date.

**ADDRESSES:** Mail comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attention: Rulemakings and Adjudications Staff.

Deliver comments to: 11555 Rockville Pike, Rockville, Maryland between 7:30 a.m. and 4:15 p.m. on Federal workdays.

For a copy of the petition, write to Michael T. Lesar, Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

You may also provide comments via the NRC's interactive rulemaking website at <http://ruleforum.llnl.gov>. This site allows you to upload comments as files in any format, if your web browser supports the function. The petition and any public comments received are available on the site. For information about the interactive rulemaking website, contact Carol Gallagher at (301) 415-5905 or via e-mail at [cag@nrc.gov](mailto:cag@nrc.gov).

The petition and copies of comments received may be inspected, and copied for a fee, at the NRC Public Document Room, (first floor) 11555 Rockville Pike, Rockville, Maryland.

The NRC maintains an Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. These documents may be accessed through the NRC's Public Electronic Reading Room (PERR) on the Internet at <http://www.nrc.gov/NRC/ADAMS/index.html>. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737 or by email to [pdr@nrc.gov](mailto:pdr@nrc.gov).

**FOR FURTHER INFORMATION CONTACT:** Michael T. Lesar, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Telephone: 301-415-7163 or Toll-free: 1-800-368-5642. E-mail: [MTL@NRC.GOV](mailto:MTL@NRC.GOV).

## **SUPPLEMENTARY INFORMATION:**

### **Background**

The Nuclear Regulatory Commission received a petition for rulemaking dated September 6, 2001, submitted by the Nuclear Energy Institute (the petitioner). The petition was docketed by the NRC on September 11, 2001, and has been assigned Docket No. PRM-50-74.

### **The Petitioner**

The Nuclear Energy Institute (NEI), petitioning on behalf of the nuclear energy industry, requests that the NRC amend its regulations relating to the standards to be used for the estimation of decay heat power in licensees' emergency core cooling evaluation models.

### **The Petitioner's Request**

The petitioner requests that the NRC amend Appendix K to 10 CFR Part 50, *ECCS Evaluation Models*, to allow licensees to voluntarily adopt the latest industry consensus standard on decay heat rates, ANS/ANSI-5.1-1994, a standard developed by the American Nuclear Society (ANS) and approved by the American National Standards Institute (ANSI). The petitioner also asks that licensees be given the option to adopt, without further rulemaking, any subsequent revisions to this standard that the NRC endorses.

### **History of the Issue Addressed in the Petition**

### The Standard Cited in the Current Regulation

In Appendix K to 10 CFR Part 50, Section I.A.4., Fission Product Decay, currently reads:

The heat generation rates from radioactive decay of fission products shall be assumed to be equal to 1.2 times the values for infinite operating time in the ANS Standard (Proposed American Nuclear Society Standards—"Decay Energy Release Rates Following Shutdown of Uranium-Fueled Thermal Reactors." Approved by Subcommittee ANS-5, ANS Standards Committee, October 1971).

The petitioner notes that this proposed ANS standard for decay heat was submitted to ANSI by ANS in 1971, but claims that ANSI, after approving minor revisions to the standard, tabled action on the standard in October 1973. The petitioner maintains that, because ANSI took no subsequent action on the proposed 1971 ANS standard, it retains the status of a proposed rather than an adopted industry consensus standard to this day.

The petitioner states that the proposed 1971 ANS standard was based on the curve recommended by K. Shure for infinite irradiation of uranium and for cooling times from 0 to  $10^9$  seconds. According to the petitioner, this approach was simplistic in that it employed a single curve to represent the decay heat power of all uranium-fueled thermal reactors. The petitioner believes that this approach ignores the fact that many phenomena make decay heat power unique to each fuel isotope. These phenomena, explains the petitioner, were assumed to be included within the appropriately large uncertainties that were adopted by the ANS-5.1 Working Group on the basis of the comparison of data available at the time.

### Subsequent ANS Decay Heat Standards

The petitioner states that, in October 1978, the ANS Nuclear Power Plant Standards Committee (NUPPSCO) approved a standard entitled "Decay Heat Power in Light Water Reactors." According to the petitioner, this standard was developed to fulfill a need for evaluations of fission reactor performance based upon improved knowledge of decay heat

power in the fuel elements. The petitioner notes that, although this new standard replaced the standard proposed in 1971, the NRC has not endorsed the updated standard in Appendix K to 10 CFR Part 50.

According to the petitioner, NUPPSCO approved a standard in August 1994 entitled “Decay Heat Power in Light Water Reactors,” which incorporated new measurements of decay heat that had been published after adoption of the 1978 standard. The petitioner states that the 1994 standard also drew upon improved nuclear databases which resulted in more precise summation calculations of decay heat. According to the petitioner, comparisons of elements of the 1978 standard with results of the new measurements and the new summation calculations had been published in a 1991 report which proposed improvements to the existing (1978) standard. In response to this report, tabular data in tables entitled “Data for Standard Decay Heat Power” and associated uncertainties were re-evaluated for three fuel isotopes --  $U^{235}$ ,  $U^{238}$ , and  $Pu^{239}$  -- and newly evaluated for  $Pu^{241}$ . The petitioner notes that the 1994 revision to ANS-5.1, which included the results of these new evaluations, has not been endorsed by the NRC in Appendix K to 10 CFR 50.

### **The Petitioner’s Proposed Amendment**

The petitioner proposes that Appendix K to 10 CFR Part 50 be amended to give licensees the option to adopt the 1994 standard (ANS/ANSI-5.1-1994), and to allow licensees to adopt any subsequent revisions to the standard endorsed by the NRC. The petitioner’s proposed amendment to Appendix K.I.A.4. reads (verbatim) as follows:

4. *Fission Product Decay.* The heat generation rates from radioactive decay of fission products shall be either (a) assumed to be equal to 1.2 times the values for infinite operation time published in the 1971 ANS Standard (Proposed American Nuclear Society Standards--“Decay Energy Release Rates Following Shutdown of Uranium-

Fueled Thermal Reactors.” Approved by Subcommittee ANS-5, ANS Standards Committee, October 1971). This standard has been approved for incorporation by reference by the Director of the Federal Register. A copy of the standard is available for inspection at the NRC Library, 11545 Rockville Pike, Rockville, Maryland 20852-2738. The fraction of the locally generated gamma energy that is deposited in the fuel (including the cladding) may be different from 1.0; the value used shall be justified by a suitable calculation; or (b) taken from the 1994 ANS Standard (American Nuclear Society Standards—“Decay Heat Power in Light Water Reactors.” Approved by ANS Nuclear Power Plant Standards Committee ANS-5.1 and American National Standards Institute, Inc., August 1994); or (c) taken from any subsequent revisions to the ANS Decay Heat standard that are endorsed by the NRC.

### **The Petitioner’s Justification for the Amendment**

Because the petitioner’s proposed amendment of Appendix K to 10 CFR Part 50 makes adoption of the 1994 standard, or any subsequent revision to it, optional for licensees, the petitioner declines to provide a cost-benefit analysis for its proposal. However, the petitioner sets out the following four arguments in support of the proposed amendment.

*The 1994 standard incorporates more precise results, is more explicit, and uses a statistical approach to address uncertainty.*

According to the petitioner, the uncertainty bands for the proposed 1971 standard currently endorsed by the NRC were chosen on the basis of data published between 1950 and 1963. The current regulation specifies that fission product decay rates be calculated by multiplying the values for infinite operating time in the proposed 1971 ANS Standard by a factor of 1.2. The petitioner states that the ANS Standards Subcommittee 5 has concluded that this factor appears to have been based upon the ANS uncertainty for cooling time (i.e., time after shutdown) less than or equal to  $10^3$  seconds.

The petitioner notes that, in contrast, the 1994 ANS standard expresses uncertainty statistically as one standard deviation in a normal distribution. The petitioner notes that the

1994 standard explicitly addresses and incorporates a conservative multiplying factor of 1.02 for the increase over U<sup>235</sup> decay heat power from U<sup>238</sup> fission products at typical U<sup>238</sup> fission rates. The petitioner notes that this multiplication factor was determined in 1974 by the ANS-5.1 Working Group, which was comprised of researchers, industry representatives, and knowledgeable NRC personnel. According to the petitioner, the basis for the advanced statistical approach used in the 1994 standard was derived from numerous contemporary data measurements, providing essentially equivalent results. The petitioner states that the revised 1994 standard for LOCA (loss of coolant accident) applications includes cooling time up to 10<sup>4</sup> seconds and incorporates more precise results than the proposed 1971 standard currently endorsed by the NRC, including detailed evaluation of the influence of neutron capture in fission products for the shutdown range, and cooling times up to 10<sup>9</sup> seconds.

Federal law requires NRC to utilize technical standards developed by voluntary consensus standard bodies.

The petitioner states that, pursuant to Management Directive 6.5, the NRC should amend Appendix K to 10 CFR Part 50 to endorse the most current industry consensus standard for decay heat power. The petitioner notes that the National Technology Transfer and Advancement Act of 1995 endorses the utilization of consensus technical standards by Federal agencies. The petitioner further notes that the NRC recently exercised Management Directive 6.5 by publishing a proposed rule (66 FR 40626; August 3, 2001) that would amend NRC regulations to incorporate by reference the latest edition and recent addenda of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code.

The amendment would allow licensees greater operational flexibility without impacting safety.

The petitioner claims that its amendment would allow licensees to gain operating margin for emergency core cooling system (ECCS) equipment based on the more realistic decay heat assumptions in the 1994 standard. According to the petitioner, this would result in more effective utilization of resources in operating and maintaining ECCS equipment, and might also allow for higher extended power uprates. The petitioner contends that safety would not be impacted because the acceptance criteria for ECCS equipment would not be changed.

*The amendment would obviate the need for future rulemakings to codify methods and practices found acceptable to the NRC.*

The petitioner's proposed amendment would give licensees the option to adopt future NRC-approved revisions to the ANS standard without the NRC having to undertake rulemakings to codify these subsequent revisions.

### **The Petitioner's Conclusion**

The petitioner maintains that its proposed amendment of Appendix K to 10 CFR Part 50 would modernize the regulation by endorsing a contemporary consensus standard that incorporates results from recent data measurements and summation calculations.

The petitioner further argues that the proposed amendment is consistent with NRC's Strategic Performance Goals. The NRC's strategic performance goals are: (1) to maintain safety, protection of the environment, and the common defense and security; (2) to increase public confidence; (3) to make NRC activities and decisions more effective, efficient, and realistic; and (4) to reduce unnecessary regulatory burden on stakeholders.

The petitioner claims that its amendment would enhance nuclear safety by basing decay heat curves and uncertainties on up-to-date data measurements for specific fuel isotopes, allowing more accurate decisions involving relative risk. According to the petitioner, the amendment would also increase public confidence because the bases and data relied upon in the latest ANS consensus standard are technically accurate and reproducible. The petitioner maintains that adopting its proposal would provide the NRC with sound and realistic technical bases for make accurate decisions about decay heat power. Better decision-making, says the petitioner, would allow the NRC staff to more effectively allocate resources to other safety significant issues. Finally, the petitioner claims that its proposed amendment would reduce unnecessary technical burden on licensees, allowing them, in turn, to expend their resources on other issues.

The petitioner states that, because the amendment would merely codify the latest consensus standard on decay heat, a direct final rule would be the most appropriate and cost-effective means of implementation.

Dated at Rockville, Maryland, this 4th day of October, 2001.

For the Nuclear Regulatory Commission.

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Annette L. Vietti-Cook,  
Secretary of the Commission.