

POLICY ISSUE

(Notation Vote)

September 11, 2003

SECY-03-0160

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations /RA/

SUBJECT: DENIAL OF PETITION FOR RULEMAKING (PRM-50-74) - AMEND
APPENDIX K TO 10 CFR PART 50 TO PROVIDE A VOLUNTARY
ALTERNATIVE WHICH WOULD REPLACE THE 1971 AMERICAN NUCLEAR
SOCIETY DECAY HEAT STANDARD WITH THE 1994 AMERICAN NUCLEAR
SOCIETY STANDARD

PURPOSE:

To request that the Commission approve the staff's recommendation to deny PRM 50-74 regarding the decay heat standard used in 10 CFR Part 50, Appendix K, "ECCS Evaluation Models."

BACKGROUND:

Section 50.46 specifies the performance criteria against which the emergency core cooling system (ECCS) must be evaluated. The criteria include the maximum peak cladding temperature, the maximum cladding oxidation thickness, the maximum total hydrogen generation, and requirements to assure a coolable core geometry and abundant long-term cooling. This regulation also states that the calculated ECCS cooling performance following postulated loss-of-coolant accidents (LOCAs) must be calculated in accordance with either a realistic (also called best-estimate) evaluation model that accounts for uncertainty or an evaluation model that conforms with the required conservative features of Appendix K evaluation models. The use of the 1971 American Nuclear Society (ANS) standard on decay heat calculation is one of the features required in the Appendix K ECCS evaluation models.

CONTACT: Peter C. Wen/NRR/DRIP/RPRP
301-415-2832

On September 6, 2001, the Nuclear Energy Institute (NEI) submitted a petition for rulemaking (PRM), designated PRM-50-74. NEI proposed a rulemaking to amend Appendix K to 10 CFR Part 50 to allow licensees the optional use of the 1994 ANS decay heat standard and to allow the use of any future Nuclear Regulatory Commission (NRC) approved revisions of the standard without additional rulemaking. The notice of receipt of the petition and request for public comment was published in the *Federal Register* (FR) on October 11, 2001 (66 FR 51884). The public comment period ended on December 26, 2001. Five letters of public comment were received in response to PRM-50-74, four from industry favoring the proposal and one from an individual opposed.

DISCUSSION:

In PRM-50-74, the petitioner stated that the 1994 ANS decay heat standard incorporates more precise results, and uses a statistical approach to address uncertainty. The petitioner proposed a rulemaking to amend Appendix K to 10 CFR 50 to allow licensees optional use of this most current consensus decay heat standard.

The staff agreed with the petitioner's view that the 1994 ANS decay heat standard represents a better technical understanding of decay heat calculation and that the 1971 ANS standard was conservative in its representation of decay heat generation. Thus, the staff initially included a recommendation to amend the Appendix K ECCS evaluation models in SECY-02-0057 as part of its proposals of risk-informed changes to 10 CFR 50.46 for Commission consideration. However, the staff was concerned that the overall conservatism provided by the Appendix K evaluation models may not be appropriately accounted for if the conservatism of using the 1971 ANS decay heat standard is selectively removed. In a July 23, 2002, memorandum to the Commission, the staff discussed a number of phenomena that are now known to contribute non-conservatism to the Appendix K evaluation models. These phenomena include boiling in the downcomer annulus during reflood, downcomer entrainment and inventory reduction due to steam bypass, and fuel relocation following cladding swelling during the temperature transient. In this memorandum, the staff concluded that, if changes are made in the decay heat standard, then changes would also have to be considered in other models to ensure that an appropriate level of overall conservatism is retained in the ECCS evaluation model package. The staff has undertaken interactions with the industry to address these issues independently from the current 10 CFR 50.46 rulemaking efforts.

After considering many relevant factors such as the availability of the best-estimate evaluation models and the concern about the overall potential non-conservatism resulting from adjusting individual Appendix K features, the Commission disapproved the staff's proposal to provide a voluntary alternative to Appendix K which would replace the 1971 ANS decay heat standard with the 1994 ANS standard. In a March 31, 2003, staff requirements memorandum (SRM) in response to SECY-02-0057, the Commission indicated its preference for use of best-estimate models rather than the piecemeal approach to updating the Appendix K evaluation models.

The staff has also evaluated the advantages and disadvantages of the rulemaking requested by the petitioner with respect to the four NRC Strategic Performance Goals:

1. Maintaining Safety: The NRC staff believes that the requested rulemaking would not make a significant contribution to maintaining safety because the overall conservatism provided by the Appendix K evaluation models may not be appropriately accounted for if the conservatism of using the 1971 ANS decay heat standard is individually removed.
2. Enhancing Public Confidence: The proposed rulemaking would not enhance public confidence without an overall assessment of the conservatism of the ECCS evaluation model. The staff believes that if changes are made in the decay heat standard, then changes would also have to be considered in other models to ensure that an appropriate level of overall conservatism is retained in the ECCS evaluation model package.
3. Improving Efficiency and Effectiveness: The NRC staff believes that it would not be efficient and effective to modify the Appendix K evaluation model using a piecemeal approach when the “best-estimate” evaluation model is already available for licensees’ use.
4. Reducing Unnecessary Regulatory Burden: The staff agrees that the proposed rule would reduce licensees’ regulatory burden. However, the staff does not agree that the associated burden is unnecessary in the absence of a demonstration that overall conservatism retained in the Appendix K evaluation models would remain adequate.

Based on this assessment, the staff has determined that PRM-50-74 should be denied.

COORDINATION:

The Office of the General Counsel has no legal objection to the denial of this petition.

RECOMMENDATION:

That the Commission:

- (1) Approve publication of the Federal Register notice announcing the denial;
- (2) Inform appropriate Congressional committees; and
- (3) Note that a letter is attached for the Secretary’s signature (Attachment 2), informing the petitioner of the Commission’s decision to deny the petition.

/RA/

William D. Travers
Executive Director
for Operations

Attachments: 1. *Federal Register* Notice
2. Letter to Petitioner

***FEDERAL REGISTER* NOTICE**

NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

[Docket No. PRM-50-74]

Nuclear Energy Institute; Denial of Petition for Rulemaking

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking: denial.

SUMMARY: The Nuclear Regulatory Commission (NRC) is denying a petition for rulemaking (PRM-50-74) submitted by the Nuclear Energy Institute (NEI or petitioner). The petitioner requested that the NRC amend its regulations regarding emergency core cooling systems to allow licensees the optional use of the 1994 American Nuclear Society (ANS) decay heat standard and to allow the use of any future NRC-approved revisions of the standard without additional rulemaking. The NRC is denying the petition because the rulemaking would adjust an individual feature of NRC regulations without consideration of potential overall non-conservatism within that portion of its regulations, and because an option to use best-estimate evaluation models is already available to its licensees.

ADDRESSES: Publicly available documents related to this petition for rulemaking may be viewed electronically on the public computers located at the NRC's Public Document Room (PDR), O1 F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. Documents may be copied by the PDR reproduction contractor for a fee.

These documents are also available electronically at NRC's Electronic Reading Room on the Internet at <http://www.nrc.gov/reading-rm/adams.html>. From this site, the public can gain entry into the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. For further information contact the PDR reference staff at 1-(800) 387-4209 or (301) 415-4737 or by e-mail to pdr@nrc.gov.

Selected documents, including comments, may be viewed and downloaded electronically via the NRC rulemaking web site at <http://ruleforum.llnl.gov>.

FOR FURTHER INFORMATION CONTACT: Peter C. Wen, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone (301) 415-2832, e-mail pxw@nrc.gov.

SUPPLEMENTARY INFORMATION:

Background

Section 50.46 specifies the performance criteria against which the emergency core cooling system (ECCS) must be evaluated. The criteria include the maximum peak cladding temperature, the maximum cladding oxidation thickness, the maximum total hydrogen generation, and requirements to assure a coolable core geometry and abundant long-term cooling. This regulation also states that the calculated ECCS cooling performance following postulated loss-of-coolant accidents (LOCAs) must be calculated in accordance with either a realistic (also called best-estimate) evaluation model that accounts for uncertainty or an evaluation model that conforms with the required conservative features of Appendix K evaluation models. The use of the 1971 ANS standard on decay heat calculation is one of the features required in the Appendix K ECCS evaluation models.

The Petition

On September 6, 2001, the Nuclear Energy Institute (NEI) submitted a petition for rulemaking (PRM), designated PRM-50-74. NEI proposed a rulemaking to amend Appendix K to 10 CFR Part 50 to allow licensees the optional use of the 1994 ANS decay heat standard and to allow the use of any future NRC-approved revisions of the standard without additional rulemaking.

In PRM-50-74, the petitioner stated that the 1994 ANS decay heat standard incorporates more precise results and uses a statistical approach to address uncertainty. The petitioner proposed a rulemaking to amend Appendix K to 10 CFR Part 50 to allow licensees the optional use of this most current consensus decay heat standard. The petitioner indicated that the amendment would (1) allow licensees to gain operating margin for ECCS equipment based on the more realistic decay heat assumptions in the 1994 ANS standard; (2) result in more effective utilization of resources in operating and maintaining the ECCS equipment; and (3) result in the potential for higher extended power uprates.

Public Comments on the Petition

The notice of receipt of the petition and request for public comment was published in the *Federal Register* (FR) on October 11, 2001 (66 FR 51884). The public comment period ended on December 26, 2001. Five letters of public comment were received in response to PRM-50-74. Four letters from industry (the Progress Energy Company, the Tennessee Valley Authority, Strategic Teaming and Resource Sharing, and the Nuclear Management Company) were in favor of the proposal, and one letter from an individual (Mr. Bob Leyse) was opposed. Mr. Leyse stated that "the entire body of ECCS evaluation models should be reviewed by the NRC rather than a piecemeal approach of selecting only those aspects that may be unduly restrictive."

Reasons for Denial

The NRC is denying PRM-50-74 because the request would adjust an individual feature of Appendix K without consideration of the overall potential non-conservatism resulting from

adjusting that portion of its regulations, and because §50.46 already includes provisions for the use of best-estimate evaluation models by NRC licensees.

The NRC agrees with the petitioner that the 1994 ANS decay heat standard represents a better technical understanding of decay heat calculation and that the 1971 ANS standard was conservative in its representation of decay heat generation. However, the NRC is also aware of a number of phenomena that are known to contribute non-conservatism to the Appendix K evaluation models. These phenomena include boiling in the downcomer annulus during reflood, downcomer entrainment and inventory reduction due to steam bypass, and fuel relocation following cladding swelling during the temperature transient. After further evaluation, the NRC believes that, if changes are made in the decay heat standard, then changes would also have to be considered in other models to ensure that an appropriate level of overall conservatism is retained in the ECCS evaluation model package.

Further, the provisions of §50.46 allow licensees use of “best-estimate” evaluation model to perform analysis of ECCS cooling performance during LOCAs. This approach provides licensees with a more accurate determination of their plants response to a LOCA, while allowing additional operational flexibility. The best-estimate evaluation represents improved and modern techniques in analyzing LOCA behavior. Thus, the NRC prefers the use of best-estimate models, rather than the piecemeal approach to updating the Appendix K evaluation models.

In addition, the NRC has evaluated the advantages and disadvantages of the rulemaking requested by the petitioner with respect to the four NRC Strategic Performance Goals as follows:

1. Maintaining Safety: The NRC believes that the requested rulemaking would not make a significant contribution to maintaining safety because the overall conservatism provided by the Appendix K evaluation models may not be appropriately accounted for if the conservatism of using the 1971 ANS decay heat standard is individually removed.
2. Enhancing Public Confidence: The proposed rulemaking would not enhance public confidence without an overall assessment of ECCS evaluation model conservatism. The

NRC believes that if changes are made in the decay heat standard, then changes would also have to be considered in other models to ensure that an appropriate level of overall conservatism is retained in the ECCS evaluation model package.

3. Improving Efficiency and Effectiveness: The NRC staff believes that it would not be efficient and effective to modify the Appendix K evaluation model using a piecemeal approach when the “best-estimate” evaluation model is already available for licensees’ use.
4. Reducing Unnecessary Regulatory Burden: The NRC agrees that the proposed rule would reduce licensees’ regulatory burden. However, the NRC does not agree that the associated burden is unnecessary in the absence of a demonstration that overall conservatism retained in the Appendix K evaluation models would remain adequate.

For reasons cited in this document, the NRC denies the petition.

Dated at Rockville, Maryland, this _____ day of _____, 2003.

For the Nuclear Regulatory Commission

Annette L. Vietti-Cook
Secretary of the Commission

Mr. Anthony R. Pietrangelo
Senior Director, Risk Regulation
Nuclear Energy Institute
1776 I Street, NW
Suite 400
Washington, D.C. 20006-3708

**SUBJECT: PETITION FOR RULEMAKING PRM-50-74: AMEND APPENDIX K TO
10 CFR PART 50 TO PROVIDE A VOLUNTARY ALTERNATIVE WHICH
WOULD REPLACE THE 1971 AMERICAN NUCLEAR SOCIETY DECAY HEAT
STANDARD WITH THE 1994 AMERICAN NUCLEAR SOCIETY STANDARD**

Dear Mr. Pietrangelo:

I am responding to your letter of September 6, 2001, which submitted a petition for rulemaking to amend 10 CFR Part 50, Appendix K, "ECCS Evaluation Models." Your letter stated that the 1994 American Nuclear Society (ANS) decay heat standard incorporates more precise results and uses a statistical approach to address uncertainty. Your letter also stated that the amendment would (1) allow licensees to gain operating margin for emergency core cooling system (ECCS) equipment based on the more realistic decay heat assumptions in the 1994 ANS standard; (2) result in more effective utilization of resources in operating and maintaining the ECCS equipment; and (3) result in the potential for higher extended power uprates.

The Nuclear Regulatory Commission (NRC) published a notice of receipt of PRM-50-74 on October 11, 2001. The public comment period ended on December 26, 2001. Five letters of public comment were received, four from industry favoring the proposal and one from an individual opposed. The opposer argued that the entire body of ECCS evaluation models should be reviewed rather than a piecemeal approach of selecting only those aspects that may be unduly restrictive.

The NRC agrees with the nuclear energy industry's view that the 1994 ANS decay heat standard represents a better technical understanding of decay heat calculation and that the 1971 ANS standard was conservative in its representation of decay heat generation. Thus, the staff initially included a recommendation to amend the Appendix K ECCS evaluation models in SECY-02-0057 as part of its proposals of risk-informed changes to 10 CFR 50.46 for Commission consideration. The recommendation would have allowed the voluntary adoption of the 1994 standard in Appendix K ECCS evaluation models, if certain user-selected options required to implement the standard were approved by the staff. However, the staff was concerned that the overall conservatism provided by the Appendix K evaluation models may not be appropriately accounted for if the conservatism of using the 1971 ANS decay heat standard is selectively removed. In a July 23, 2002, memorandum to Commission, the staff discussed a

number of phenomena that are now known to contribute non-conservatism to the Appendix K evaluation models. These phenomena include boiling in the downcomer annulus during reflood, downcomer entrainment and inventory reduction due to steam bypass, and fuel relocation following cladding swelling during the temperature transient. In this memorandum, the staff concluded that, if changes are made in the decay heat standard, then changes would also have to be considered in other models to ensure that an appropriate level of overall conservatism is retained in the ECCS evaluation model package. The staff has undertaken interactions with the industry to address these issues independently from the current 10 CFR 50.46 rulemaking efforts.

After considering many relevant factors such as the availability of the best-estimate evaluation models and the concern about the overall potential non-conservatism resulting from adjusting individual Appendix K features, the Commission disapproved the staff's proposal to provide a voluntary alternative to Appendix K which would replace the 1971 ANS decay heat standard with the 1994 ANS standard. In a March 31, 2003, staff requirements memorandum (SRM) in response to SECY-02-0057, the Commission indicated its preference for use of best-estimate models rather than the piecemeal approach to updating the Appendix K evaluation models.

Based on these factors, the NRC denies the petition (PRM-50-74). Further details are discussed in the enclosed Notice of Denial of Petition for Rulemaking, which will be published in the *Federal Register*.

Sincerely,

Annette L. Vietti-Cook
Secretary of the Commission

Enclosure: *Federal Register* Notice of Denial of
Petition for Rulemaking