December 18, 2001

MEMORANDUM TO: Cynthia A. Carpenter, Chief
Risk Informed Initiatives, Environmental, Decommissioning,
and Rulemaking Branch
Division of Regulatory Improvement Programs, NRR

FROM: Samuel S. Lee, Project Manager/**RA/**
Risk Informed Initiatives, Environmental, Decommissioning,
and Rulemaking Branch
Division of Regulatory Improvement Programs, NRR

SUBJECT: NOTICE OF MEETING WITH THE NUCLEAR ENERGY INSTITUTE (NEI) REGARDING PETITION FOR RULEMAKING (PRM) 50-74, A REQUEST TO AMEND REGULATIONS RELATED TO STANDARDS USED FOR ESTIMATION OF DECAY HEAT POWER IN EMERGENCY CORE COOLING EVALUATION MODELS

DATE AND TIME: January 15, 2002
1:30 p.m. - 4:30 p.m.

LOCATION: U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852
Room T-10-A1

PURPOSE: To discuss technical basis for PRM 50-74. A preliminary agenda is attached (Attachment 1). Also attached is NRC Staff's questions addressing the technical basis for the petition (Attachment 2).

PARTICIPANTS*:

| NRC | INDUSTRY |
|---|---|
| G. Holahan | T. Pietrangelo, NEI |
| J. Rosenthal | M. Nissley, Westinghouse |
| S. Bajorek | R. Hill, General Electric |
| N. Lauben | T. Reick, Excelon |
| J. Wermiel | E. Anderson, NEI et. al. |
| R. Caruso et. al. | |

Project No. 689
Attachment: Agenda
cc: See next page

* Meetings between NRC technical staff and applicants or licensees are open for interested members of the public, petitioners, interveners, or other parties to attend as observers pursuant to the Commission Policy Statement on "Staff Meetings Open to the Public: Final Policy Statement," 65 *Federal Register* 56964, 9/20/2000. Members of the public who wish to attend should contact S. Lee at (301) 415-1061 or ssl@nrc.gov.

PRELIMINARY AGENDA FOR NRC-INDUSTRY
MEETING ON LICENSING DIGITAL UPGRADE ISSUES

January 15, 2002; 1:30 p.m. - 4:30 p.m.
Room T-10-A1

| | |
|---|---|
| Introduction and Opening Remarks | NRC/NEI |
| Discussion of NRC Staff Views on Replacement of Appendix K Decay Heat Requirement and Revision of ECCS Evaluation Model Requirements | NRC/NEI |
| Discussion of NRC Staff Comments on PRM 50-74 | NRC/NEI |
| Next Steps and Schedule | NRC/NEI |
| Closing | |

ATTACHMENT 1

## QUESTIONS AND COMMENTS PERTAINING TO THE NEI PETITION TO REVISE THE REQUIREMENTS FOR FISSION PRODUCT DECAY HEAT IN APPENDIX K TO 10CFR50

**1. Wording of the proposed amendment -** The proposed wording references the 1994 ANS standard and future NRC approved revisions to the decay heat standard. However, the proposed wording changes could be read to mean that the 1994 and future approved standards only apply to the sentence that describes gamma energy deposition. The 1994 standard does not address recommendations for gamma energy deposition. Please clarify the wording of the proposed amendment.

**2. Application of specific options in the 1994 standard -** The 1971 decay heat standard was much simpler than the 1994 standard. Only three things were required in Appendix K to specify decay heat using the 1971 standard: (1) the "curve" itself, (2) the 1.2 multiplier, and (3) infinite irradiation. The result was a conservative application that was the same for all users. To use the 1994 standard many more choices must be specified either by the NRC or the users. If NRC makes the choices ahead of time, either in the Appendix K revision or a regulatory guide, the regulatory process would be predictable and stable. If each applicant or licensee selects the options, a lengthy review process may result. A sampling of the choices are given below:

1. Operating Time - Infinite operating time is the simple choice in Appendix K. A histogram of operating cycles would also be possible.

2. Fission Fractions Per Isotope - The 1971 standard assumed $^{235}U$ as the only fissionable isotope. Three additional isotopes are used in the 1994 standard. Fission fractions vary with time and space.

3. Neutron Capture - The effect was added in the 1979 and 1994 standards. The effect is burnup dependent and adds to the decay heat.

4. Fission Energy - Each fissionable isotope has different recoverable fission energies which are required for use in the standard. There are uncertainties in the values not specified in the standard.

5. Actinide (Heavy Element) Decay - The same basic equations are described in the 1971, 1979 and 1994 standards. However, the required $^{239}U$ fission yield is burnup and enrichment dependent.

6. Tabular Data - Three tables are provided for each of the four fissionable isotopes. The selection must be made depending on the method chosen for calculating decay heat.

If the NRC adopts the proposed amendment, the parameters and options would be specified for the 1994 and all future revisions to the decay heat standard. If NEI has an alternate proposal, please provide it with a full justification.



**3. Overall Uncertainty** - It is generally recognized that the Appendix K application of the 1971 decay heat standard has a degree of conservatism that exceeds decay heat uncertainty. This

additional conservatism has often been perceived as compensation for other ECCS analytical uncertainties. The uncertainty methods described in the 1994 standard are smaller than those in the 1971 standard and are not designed to account for other ECCS analytical uncertainties. Use of the 1994 standard with nominal inputs and uncertainties could result in a substantial reduction in overall conservatism in Appendix K analysis. Consequently, the consideration of individual non-conservatisms becomes more important. If the magnitude of one or more non-conservatisms is too large, the overall conservatism which supplies the adequate margin of safety may be in jeopardy.

The NEI petition and the current version of Appendix K make no break size distinction concerning the application of the decay heat requirement. It is well known that longer transients, such as small breaks, would derive a substantially larger benefit from a reduction in decay heat compared to the faster large break transient. Among the required features of Appendix K, decay heat is the only one that has a clear application to small breaks.

How should the NRC and industry deal with recognized non-conservatisms related to Appendix K Evaluation Models? How does industry intend to investigate uncertainty in Appendix K models, identify non-conservatisms, and assure that an Appendix K Evaluation Model with reduced decay heat remains conservative ?

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