MEMORANDUM TO: Cynthia Carpenter, Chief
Generic Issues, Environmental, Financial & Rulemaking Branch
Division of Regulatory Improvement Programs, NRR

FROM: Joseph Birmingham, Project Manager
Generic Issues, Environmental, Financial & Rulemaking Branch
Division of Regulatory Improvement Programs, NRR

SUBJECT: SUMMARY OF MEETING WITH THE NUCLEAR ENERGY INSTITUTE (NEI) ON THE STATUS OF THE NEI RISK-INFORMED POST-FIRE SAFE SHUTDOWN CIRCUIT ANALYSIS (FIRE-INDUCED CIRCUIT FAILURES) METHODOLOGY DEVELOPMENT EFFORT

The Nuclear Regulatory Commission (NRC) held a public meeting with the Nuclear Energy Institute (NEI) in Rockville, Maryland on December 20, 1999, to discuss the status of NEI's risk-informed post-fire safe shutdown circuit analysis (fire-induced circuit failures) methodology development effort. Three members of the Boiling Water Reactor Owners Group (BWROG) Appendix R Committee attended the meeting to provide any further information needed on the methodology's relationship to the recently completed BWROG deterministic post-fire safe shutdown circuit analysis methodology. A list of attendees is attached (Attachment 1). An initial draft outline of the industry circuit analysis methodology had been provided to the staff in advance of the meeting (Attachment 2). The NEI representatives gave a slide presentation on the current status of the industry methodology (Attachment 3).

The NEI representatives stated that they have conducted the NEI risk-based methodology development effort under the assumption that it (and the complementary BWROG methodology) will be used by licensees to address known issues or past incomplete analyses to the extent they are identified in the future. Consequently, industry is seeking NRC endorsement of the industry methods as one acceptable approach to addressing fire-induced circuit failure issues. The staff stated that, rather than relying solely on NRC inspection results to indicate the need for post-fire safe shutdown circuit re-analysis, licensees need to follow valid criteria with which to pro-actively judge the adequacy of previous licensee circuit analysis assessments and analyses.

The staff stated that the NEI outline of its risk-based post-fire safe shutdown circuit analysis methodology appeared to constitute an acceptable conceptual approach to the issue. Based on the discussions during the meeting, the staff expects the revised methodology outline (discussed below) will be an acceptable approach.

At the conclusion of extensive discussions the following agreements were reached:

- NEI will develop a "graduated trigger device" (initiation criteria) proposal for licensee fire-induced circuit failure re-analysis, and this set of criteria will be incorporated in NEI's

self-assessment methodology (which is the subject of a January 21, 2000 industry workshop). The NRC will informally review and comment on NEI's proposed circuit analysis self-assessment initiation criteria in advance of the industry workshop (i.e., the NRC will place the NEI criteria and related NRC comments on its reactor fire protection website before January 20, 2000).

- NEI agreed to revise its methodology outline (Attachment 2) based in whole or in part on the comments provided during the December 20, 1999 meeting, and include a near-term issue closure schedule. NEI will provide the NRC staff with a letter containing the revised methodology and schedule by January 17, 2000.

- Upon review of the NEI initiation criteria proposal, revised methodology outline, and near-term issue closure schedule, the NRC will determine whether, and in what manner, the Enforcement Guidance Memorandum (EGM) 98-002, Revision 1, Appendix R formal enforcement deferment could be extended.

- NEI will provide a complete draft of the NEI risk-based post-fire safe shutdown circuit analysis methodology by March, 2000. It is expected that this draft will be reviewed in parallel with NEI and EPRI conducted fire tests and NEI risk-based circuit analysis methodology pilot applications.

- The next meeting between NEI and the staff is planned for March or early April, 2000.

A detailed summary of the agreements reached at the meeting is included as Attachment 4.

Project No. 689

Attachments:
1. List of Attendees
2. Draft Outline of the NEI Methodology
3. NEI Slide Presentation
4. Summary of Agreements

cc w/att 1: See list

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LIST OF ATTENDEES, DECEMBER 20, 1999
NRC/NUCLEAR ENERGY INSTITUTE MEETING ON APPENDIX R CIRCUIT ANALYSIS

NAME	ORGANIZATION
J. Hannon	Office of Nuclear Reactor Regulation (NRR)/Division of Systems Safety and Analysis (DSSA)/Plant Systems Branch (SPLB)
J. Birmingham	NRR/RGEB
P. Qualls	NRR/DSSA/SPLB
L. Whitney	NRR/DSSA/SPLB
S. West	NRR/DSSA/SPLB
S. Wong	NRR/DSSA/Probabilistic Safety Assessment Branch
R. Jenkins	NRR/Division of Engineering/Electrical and Instrumentation Controls Branch
D. Modeen	Nuclear Energy Institute
F. Emerson	Nuclear Energy Institute
T. Gorman	Boiling Water Reactors Owners Group (BWROG)
G. Warren	BWROG
S. Hardy	Carolina Power and Light
R. Hill	Southern Nuclear - Farley
V. Warren	PECO Energy
F. Wyant	Sandia National Laboratory
N. Siu	RES
M. Dey	RES
R. Jenkins	NRR/DE/EELB
J. Hyslop	NRR/DSSA/SPLB
M. Pohida	NRR/DSSA/SPLB
A. Wyche	SERCH Licensing/Bechtel
K. Green	NUSIS

NRC Staff and NEI Meeting on Circuit Analysis
Summary of Topics Covered and Agreements Reached

- NEI and the Electric Power Research Institute (EPRI, developer of circuit failure characteristics input for the NEI methodology) intend to use the BWROG deterministic circuit failure analysis methodology at selected points within the NEI risk-based methodology without direct integration. Essentially, licensee use of the two methodologies will be complementary, but the two methodologies will not necessarily be integrated into one document.

- As with the BWROG deterministic methodology (recently submitted to the staff for review), the outlined NEI risk-based methodology appears applicable to both PWRs and BWRs.

- NEI expects that its final methodology will screen out multiple high impedance faults (MHIFs) and certain valve actuator faults.

- The NEI methodology will address pairs of spurious actuations and fire-induced valve actuator damage (as described in Information Notice 92-18). NEI believes that the BWROG has, in its recently submitted document, addressed the issue of multiple electrical faults per fire.

- A number of clarification comments regarding the outlined NEI risk-based methodology were made during the meeting:

  - All attendees agreed that the background criteria for the two entry values of Table 1 of Attachment 2 (fire frequency and probability of circuit failures) will need development work, and that information developed in the future by RES could be used to provide some support. However, the RES representatives stated that their program plan for analyzing fire frequency versus fire severity (not circuit failure probability) would not be ready until September 2000, and the staff expressed unease with tying the resolution of this “operational” issue to the completion of NRC research activities. NEI will not necessarily await completion of NRC research before completing the development of Table 1.

  - All attendees agreed that the engineering work necessary to develop the “Pccd2" conditional core damage probability (the probability of survival and functioning of non-designated and unanalyzed post-fire safe shutdown equipment and cables) would be significant, depending on the availability of safe shutdown analysis information (e.g. cable routing and locations) for the equipment not previously credited.

  - Fire location is a characteristic of fire size in Screen 2 of NEI’s methodology.

  - Although on Slide 24 of Attachment 3 it appeared that all circuit failures lead to spurious actuations, the NEI methodology’s probability factor for severe fire effects operates to reduce the likelihood of spurious actuations based on an assessment of fire sizes and circuit failure probabilities.

- The criteria for detection and suppression effectiveness is to be a decision based on fire protection engineering principles.

- The NEI representatives stated that their position in Attachment 2 that only control room fires need to be analyzed for IN 92-18 effects has been changed. Therefore, the next version of the NEI methodology will additionally address change in core damage frequency (delta CDF) for fires outside the control room as appropriate based on by plant-specific configurations.

- The answer to the question “when does the fire damage stop?” is inherent in the methodology’s fire size determination.

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