April 27, 2016

MEMORANDUM TO: Sunil Weerakkody, Chief
PRA Operations and Human Factors Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation

FROM: Alexander Schwab, Project Manager ***/RA/***
Generic Communications Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE MARCH 16, 2016, PUBLIC MEETING TO DISCUSS NRC STAFF'S COMMENTS ON NUCLEAR ENERGY INSTITUTE WHITE PAPERS ON CREDITING MITIGATING STRATEGIES EQUIPMENT IN RISK-INFORMED DECISION MAKING

On March 16, 2016, a Category 2 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and stakeholders. The purpose was to discuss NRC staff comments on the Nuclear Energy Institute (NEI) white papers on crediting mitigating strategies equipment in risk-informed decisionmaking. The meeting notice and NEI white papers can be found in the Agencywide Documents Access and Management System (ADAMS) at Accession Numbers ML16074A374, ML15337A103, and ML15337A105 respectively.

During the opening comments, attendees were informed that although their comments were discussed with the staff, no decisions would be made at the meeting. Rather, this meeting summary would document the staff's comments along with any industry follow-up actions associated with the meeting.

Prior to the meeting, NRC staff transmitted 20 comments to be discussed at the public meeting. After the NRC's opening comments, a discussion of 13 NRC staff comments on NEI's white paper titled, "Qualitative Assessment for Crediting Mitigating Strategies Equipment in Risk-Informed Decision Making" took place. The remainder of the meeting was spent discussing the seven substantive NRC staff comments on the white paper, "Streamlined Approach for Crediting FLEX in Risk-Informed Decision Making". The NRC staff comments and NEI presentation materials can be found in ADAMS Accession Number ML16082A355.

<u>Qualitative Assessment for Crediting Mitigating Strategies Equipment in Risk-Informed Decision Making</u>

Following is a summary of the 13 NRC staff comments and associated discussions:

1. The white paper gives the impression that licensee guidance governs which qualitative credit processes can be considered, when it is NRC guidance that should be referenced.

NEI agreed to revise the white paper to address this staff comment.

2. The white paper should clarify the differences between terms such “FLEX” and “mitigating strategies” to ensure that all stakeholders have a common understanding of the scope of the document.

NEI agreed to revise the white paper to address this staff comment.

3. The white paper should clarify that qualitative risk insights cannot be used in lieu of quantitative risk inputs. Current NRC process guidance is clear about various applications where qualitative and quantitative guidance can be used.

NEI stated it wasn’t their intent to suggest that qualitative risk insights can be used in situations where NRC guidance requires licensees to provide quantitative inputs. NEI agreed to revise the white paper to address this staff comment.

4. The white paper should clarify what “other” equipment this guidance should cover (e.g., B5b), or omit sentences that refer to “other” equipment. Staff believes that crediting “off-site FLEX equipment” should be out of scope.

NEI agreed to modify the white paper to be more specific regarding “other” equipment. However, NEI stated that off-site equipment should not necessarily be out of scope because there may be certain circumstances where off-site equipment could be reliably used and credited.

5. The white paper should include, if possible, summaries of ongoing or planned industry initiatives which will enable licensees to incorporate qualitative insights into time critical applications such as notices of enforcement discretion (NOEDs), analyses completed under Management Directive 8.3, and the significance determination process (SDP) with minimal challenges on timeliness.

NEI stated that they considered these discussions to be outside the scope of the white paper.

6. The term “reactivity control” in section 5.2 could use more explanation or examples.

NEI explained that the term refers to the function provided, and further definition may impose limits on how licensees use their equipment in support of the function. NEI agreed to consider including examples to further clarify the white paper.

7. The white paper should clarify which containment functions are described in section 5.2.

NEI explained that the term refers to the function provided, and further definition may impose limits on how licensees use their equipment in support of the function. NEI agreed to consider including examples to further clarify the white paper.

8. The white paper should avoid using language that a licensee may interpret as compliance with NEI 12-06, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide”, as the only requirement necessary to obtain credit. NEI 12-06 was endorsed as a method to comply with orders issued by the Commission as a result of events at the Fukushima Daiichi Nuclear

Power Plant. Obtaining credit in areas other than beyond design basis external events may require a higher level of verification and validation depending on the application being considered.

NEI agreed to revise the white paper to address this staff comment.

9. The white paper seems to indicate that time is the most relevant factor in determining operator reliability. Other performance shaping factors such as complexity, frequency of training for the specific scenario, quality of procedures, and context specific experience need to be considered, and are arguably more important performance drivers.

NEI agreed that other factors are important, but explicit inclusion in the white paper is not necessary since they are implied by the comprehensive evaluation. NEI agreed to clarify the white paper noting other important performance drivers.

10. The white paper should contain a paragraph that clearly explains how scenario specific cognitive human errors should be addressed.

NEI agreed to modify the white paper, "Streamlined Approach for Crediting FLEX in Risk-Informed Decision Making", where this staff comment is more applicable.

11. The white paper should be modified to indicate that pre-deployment may help with known events (e.g. maintenance risk assessment, NOEDs), but should be excluded for historical events (e.g. SDP analyses) as conditions were not previously known and equipment was not pre-deployed in those instances.

NEI agreed to revise the white paper to address this staff comment.

12. NRC staff and industry should align on a standard level of qualitative credit that may be given to "written instructions."

NEI indicated that the white paper was not intended to provide detailed guidance on the amount of credit that may be given to procedures of various pedigrees, and it would not be modified to address this comment.

13. NRC staff and industry should establish alignment on quality and frequency, and the degree of qualitative credit appropriate for the applications.

NEI indicated that the white paper was not intended provide detailed guidance on specific applications, and it would not be modified to address this comment.

<u>Streamlined Approach for Crediting FLEX in Risk-Informed Decision Making</u>

Following is a summary of the seven NRC staff comments and associated discussions:

1. Use of 0.1 as the screening value for human error probability (HEP) is not appropriate.

NEI referenced NUREG 1792, "Good Practices for Implementing Human Reliability Analysis (HRA)," as a basis for this screening value. However, NUREG 1792 clearly indicates that: "Use

of screening HEPs is acceptable provided (1) it is clear that the individual values used are overestimations of the probabilities if detailed assessments were to be performed, and (2) dependencies among multiple HFEs appearing in an accident sequence are conservatively accounted for." This application does not meet these requirements. In addition, the screen value does not address the four performance shaping factors of time margin, environment, command and control, and equipment availability.

NEI defended their use of the 0.1 screening value by saying that it was in line with generally accepted likelihood values, and gave several examples of risk documents in a variety of different general uses that showed the 0.1 value was appropriate. NEI does not plan to revise the white paper to address this staff comment.

2. The white paper does not discuss cognitive failure (i.e., failure to understand the condition to decide to implement the FLEX strategy in time).

NEI acknowledged the white paper does not address the cognitive element explicitly, but the assumption is that these considerations would be contained within the analysis of the specific scenario. NEI agreed to revise the white paper to address this staff comment.

3. The white paper uses a 0.01 failure probability when N+1 trains of equipment are available. This approach is overly optimistic, and does not consider common cause failure attributes.

NEI agreed with the comment and will revise the white paper using a more appropriate screening value.

4. The current white paper's approach requires revision because it assumes that there is only a risk benefit from implementing the FLEX strategies, and never the potential for a risk increase. For example, there may be scenarios where implementing FLEX for a loss of off-site power (LOOP) event causes risk increases in certain sequences due to deep load shedding, and the potential increase in non-recovery probabilities (e.g. off-site power, emergency diesel generators). The white paper should address this issue, and instruct licensees to evaluate the net change in risk due to both positive changes (e.g., due to extra equipment available), and negative changes (e.g., due to increased non-recovery probabilities).

NEI agreed to investigate this issue in more detail, but added that a properly performed risk analysis would address these considerations with changes to the base probabilistic risk assessment (PRA) model.

5. To properly evaluate the risk of a performance deficiency, the risk analysts determine the increase above the base plant risk that is associated with the performance deficiency. Therefore, the impact of the FLEX equipment needs to be addressed in the base case as well as the non-conforming case to get a proper assessment of the increase in risk.

NEI agreed with the comment but noted that this is addressed in the appendices of the white paper. NEI plans to include a discussion of this item in the main body of the white paper to address the staff comment.

6. The NRC staff is in the process of developing a new appendix to Inspection Manual Chapter (IMC) 0609 to address performance deficiencies (PD) with respect to Order EA 12-049. When

FLEX strategies are credited in other applications, as discussed in the white paper, then performance issues associated with FLEX equipment may be treated as PDs under existing appendices (e.g. appendix A) of IMC 0609. The white paper should include a brief discussion about this aspect.

NEI understood the staff comment, but no commitment was made to modify the white paper to address this comment.

7. In PRA, the plant must be brought to a safe and stable state to prevent core damage, which is typically reached within a 24 hour mission time. In the scenarios being considered in the white paper, a typical 24 hour mission time may not be appropriate to assess FLEX equipment reliability. The white papers should explicitly address the need to extend the analysis time beyond 24 hours in these cases.

NEI agreed with the comment, referring to the American Society of Mechanical Engineers/American Nuclear Society PRA Standard definition of safe and stable as “a plant condition, following an initiating event, in which reactor coolant system conditions are controllable at or near desired values.” NEI agreed to consider adding this definition to the white paper to address the staff comment.

The NRC staff also commented that the white paper could include more examples to show scenarios where FLEX equipment wouldn’t receive much credit. NEI agreed that including more examples, including some where crediting portable equipment was not feasible, would enhance the usability of the white paper.

A list of meeting attendees is enclosed.

Please direct any inquiries to Alexander Schwab, Project Manager, at 301-415-8539, or Alexander.Schwab@nrc.gov.

Enclosures:
List of Attendees

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Enclosures:
List of Attendees

EXTERNAL DISTRIBUTION:
Dave Lochbaum - dlochbaum@ucsusa.org

DISTRIBUTION:

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ADAMS Accession Nos.: Meeting Notice/ML16074A374; Meeting Materials/ML16082A355; Meeting Summary/ML16104A359 NRR-001

OFFICE	NRR/DPR/PGCB/PM	NRR/DPR/LA	NRR//DRA	NRR//DRA	NRR/DPR/PGCB/PM
NAME	ASchwab	ELee	JMitman	SWeerakkody (MMontecalvo for)	ASchwab
DATE	03/30/2016	04/18/2016	4/27/16	4/25/16	4/27/16

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ATTENDANCE LIST
PUBLIC MEETING TO DISCUSS NRC STAFF'S COMMENTS ON NUCLEAR ENERGY INSTITUTE WHITE PAPERS ON CREDITING MITIGATING STRATEGIES EQUIPMENT IN RISK-INFORMED DECISION MAKING

March 16, 2016
10:00 a.m. - 4:00 p.m.

NAME	ORGANIZATION
Thomas Zachariah	NEI
Donald Vanover	ERIN/Exelon
Philip Tarpinian	Exelon
Andrew Bittlemann	EPM, Inc.
Ray Fine	FENOC
Richard Haessler	Westinghouse
Michael Tschiltz	NEI
John Weglian	EPRI
Michael Powell	APS
Ricardo Davis	Duke Energy
N. Prasad Kadambi	Public
Peter Appignani	NRC/RES/DRA
Jerrod Demers	NRC/NRR/DRA
Donald Helton	NRC/RES/DRA
Fernando Ferrante	NRC/RES/DRA
Jeff Circle	NRC/RES/DRA
Mark Caruso	NRR/NRO/DSRA
Stewart Bailey	NRC/NRR/JLD
Yung Hsiem James Chang	NRC/RES/DRA
Laura Kozak	NRC/Region III
William Cook	NRC/Region I
Brandon Hartle	NRC/NRR/DRA
Sunil Weerakkody	NRC/NRR/DRA
Jeff Mitman	NRC/NRR/DRA
Michael Montecalvo	NRC/NRR/DRA
Matthew Humberstone	NRC/NRR/DRA
Alexander Schwab	NRC/NRR/DPR
Chris Hunter	NRC/RES/DRA
Leroy Hardin	NRC/RES/DE
Ed Wiegert	Duke Energy

Enclosure

Diane Jones	Enercon
Joylynn Quinones-Navarro	NRC/NRR/JLD
Gary Demoss	PSEG
Marie Pohida	NRR/NRO/DSRA