

April 23, 2013

MEMORANDUM TO: Rani L. Franovich, Chief
Performance Assessment Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

FROM: Ronald K. Frahm, Jr., Senior Reactor Operations Engineer */RA/*
Performance Assessment Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF PUBLIC MEETING HELD ON MARCH 25, 2013,
TO CONTINUE DISCUSSIONS REGARDING APPROACH FOR
RISK-INFORMING THE REACTOR OVERSIGHT PROCESS
FOR NEW REACTORS

On March 25, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff hosted a Category 2 public meeting with the Nuclear Energy Institute (NEI) and other interested stakeholders at the NRC's Two White Flint North building in Rockville, Maryland. The purpose of this meeting, as noted in the meeting notice dated March 11, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13066A891), was to continue to discuss specific aspects of the Commission's Staff Requirements Memorandum (SRM) to the Office of the Secretary (SECY)-12-0081, "Risk-Informed Regulatory Framework for New Reactors." The meeting attendance list is provided in the Attachment. The slide package distributed and presented by the staff was made publicly available prior to the meeting (ADAMS Accession No. ML13081A110).

The staff began by briefly summarizing the Reactor Oversight Process (ROP)-related aspects of SECY-12-0081 and the resultant SRM, and then recapped its approach to address the SRM and progress made since the initial meeting on February 5, 2013. The staff discussed the purposes of the ROP and several key messages that should be considered in the staff's evaluation and conveyed in the Commission paper.

The staff then discussed the technical bases for using a deterministic approach in determining a risk-informed regulatory response. The staff noted that the primary reason for proposing and outlining an approach that considers deterministic (qualitative) factors, along with calculated risk (quantitative) results based on a plant's probabilistic risk assessment (PRA), was to ensure that infrequent yet potentially significant performance issues receive an appropriate regulatory response.

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The staff noted that the approach of supplementing risk evaluations with deterministic factors was guided by several sources, most notably:

- Regulatory Guide (RG) 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-informed Decisions on Plant-specific Changes to the Licensing Basis,”
- SECY-99-007a, “Recommendations For Reactor Oversight Process Improvements (Follow-up to SECY-99-007),” and
- 60 Federal Register 42622, “Use of Probabilistic Risk Assessment Methods in Nuclear Activities: Final Policy Statement;” the Commission’s PRA Policy Statement from 1995

The staff described a conceptual framework to determine the significance of inspection findings within the Initiating Events, Mitigation Systems, and Barrier Integrity cornerstones that would use a combination of traditional quantitative methods (e.g., a plant’s PRA) augmented with a structured, qualitative (deterministic) approach in an integrated risk-informed fashion. The staff referred to this conceptual approach as the “integrated risk-informed approach.” Qualitative factors, such as defense-in-depth, safety margins, condition time, level of uncertainty, and significant qualitative credit, would be rated based on their impact on safety to determine the level of degradation that these factors would contribute to the performance deficiency. The overall qualitative rating would be determined using a structured methodology and decision tree. The staff then described the concept of a significance determination table that would consider both qualitative and quantitative risk insights to arrive at a final significance determination in an integrated, structured, and predictable fashion. The staff briefly discussed some examples that could test the effectiveness of this conceptual approach.

Participants noted that this approach was consistent with RG 1.174 and appeared to appropriately incorporate deterministic factors with quantitative results, but agreed that additional detail around how these factors would be evaluated would need to be developed for a fully informed future discussion. Industry participants expressed concern that some factors may be “double-counted” in both the quantitative and qualitative evaluations, but the staff noted its intent to explicitly define the deterministic factors in a manner that would exclude those that have already been accounted for in the risk calculations. Also, members from industry noted that the qualitative evaluation only seemed to escalate the significance of a finding and did not appear to mitigate the significance. The staff noted its intent to clarify that the significance could be reduced as well as increased based on the proposed qualitative evaluation.

Next, the staff presented the relative risk approach as proposed by the Advisory Committee on Reactor Safeguards. To facilitate the discussions, the staff discussed the baseline core damage frequencies (CDFs) for each of the new reactor designs and discussed how baseline CDF would affect the relative risk approach. The staff noted that the higher the baseline CDF, the lower the percentage change in risk necessary to cross risk thresholds and increase regulatory response. The staff presented a table that consolidated the results from the 2011 SDP tabletop exercises that used existing risk thresholds, and compared them to the results for the same scenarios when applying: (1) a purely relative risk threshold approach, (2) a relative risk approach that included seismic estimates, and (3) the conceptual integrated risk-informed approach that incorporates deterministic factors as previously presented by the staff. Participants noted that the scenarios used for the 2011 tabletops were conservative and often assumed extended exposure times and common cause failures to reach thresholds that resulted in an increased regulatory response. Also, participants noted that when comparing the

regulatory response of similar scenarios, the conceptual integrated risk-informed approach typically resulted in a higher significance than the 2011 tabletop results and a lower significance than a purely relative risk approach.

Several pros and cons of a relative risk approach were discussed from the staff's 2009 white paper and NEI's 2009 white paper; additional considerations that were not specifically captured in either white paper also were discussed. Participants noted that although the relative risk approach may potentially be viable, the cons of the relative risk approach appear to outweigh the pros of such an approach. Some of the more significant impediments to a relative risk approach that were discussed included: (1) the difficulty in defining baseline CDF; (2) articulating the potential differences in regulatory approach for operating and new reactors; (3) the potential to overly infringe upon the operational flexibility afforded the safer and more robust new reactor designs; (4) the complexity in developing, documenting, and implementing a relative risk approach; and (5) the potential to inadvertently focus licensee and staff attention on relatively insignificant issues. Participants noted that the integrated risk-informed approach would likely provide a timely and appropriate response in a simpler manner. Participants further noted that even if a relative risk approach were adopted, an integrated approach that considers deterministic factors may still be needed to appropriately respond to infrequent yet potentially significant performance issues that would not otherwise be considered based solely on risk calculations.

The staff discussed two alternative approaches to the purely relative risk approach: (1) a hybrid approach that includes an absolute CDF threshold at higher baseline CDF values, and transitions into a relative CDF threshold at lower baseline CDF values; and (2) a staircase threshold approach that incorporates step drops in relative CDF at specific baseline CDFs. Participants noted that the hybrid approach may have some merit and warrants additional discussion. However, participants noted that the staircase approach did not appear to be feasible, primarily because of the cons associated with the sudden change in delta CDF at specific baseline CDF values, which would result in a different significance determination based on an insignificant change in CDF.

As a result of these discussions, the participants recognized the need to further discuss the deterministic aspects of the integrated risk-informed approach and the feasibility of the relative risk approach. Participants also noted the need to more fully develop and discuss conceptually illustrative examples and pros and cons to each approach. NRC staff noted its intent to further define and discuss the deterministic factors (and their bases) at a subsequent meeting. NEI staff agreed to further evaluate the pros and cons of a relative risk approach, particularly the hybrid approach, and to discuss them at a subsequent meeting. Participants agreed that the subsequent meeting could be scheduled for April 15, 2013. The meeting has since been scheduled and publicly noticed for the afternoon of April 15, 2013, in the NRC's Two White Flint North building (ref. ADAMS Accession No. ML13086A933).

Attachment:
As stated

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Attachment:

As stated

ADAMS Accession No.: ML13100A156 memo

ML13100A226 pkg.

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DATE	04/23/13	04/22/13

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**APPROACH FOR RISK-INFORMING
THE ROP FOR NEW REACTORS**

March 25, 2013

Meeting Attendance

Ronald Frahm	NRC/NRR/DIRS
Rani Franovich	NRC/NRR/DIRS
Allen Howe	NRC/NRR/DIRS
Stephen Vaughn	NRC/NRR/DIRS
Eric Powell	NRC/NRO/DSRA
Lynn Mrowca	NRC/NRO/DSRA
Ayo Ayegbusi	NRC/NRO/DSRA
Donnie Harrison	NRC/NRO/DSRA
Jeff Circle	NRC/NRR/DRA
Steven Laur	NRC/NRR/DRA
Donald Chung	NRC/NRR/DRA
John Jolicoeur	NRC/OCM/AMM
James Slider	NEI
Biff Bradley	NEI
Roy Linthicum	PWROG
John Giddens	Southern Nuclear

By Teleconference:

Tom Kozak	NRC/NRO/DCIP
Audrey Klett	NRC/NRR/DIRS
Chris Hunter	NRC/RES
April Rice	SCANA, VC Summer
Gerald Loignon	SCANA, VC Summer
Duc Nguyen	SCANA, VC Summer
Jonathon Li	GE-Hitachi
Patrick O'Regan	EPRI
Steve Nass	Westinghouse
Thomas Roberts	MPR Associates