



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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June 17, 2016

MEMORANDUM TO: John Nakoski, Chief
Performance and Reliability Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research

FROM: Anders Gilbertson, Reliability and Risk Analyst */RA/*
Performance and Reliability Branch
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SUBJECT: PUBLIC MEETING ON THE DEVELOPMENT OF REGULATORY
GUIDE 1.174, REVISION 3, "AN APPROACH FOR USING
PROBABILISTIC RISK ASSESSMENT IN RISK-INFORMED
DECISIONS ON PLANT-SPECIFIC CHANGES TO THE
LICENSING BASIS"

On May 23, 2016, the Nuclear Regulatory Commission (NRC) staff held a public meeting to obtain stakeholder feedback on a draft revision of the guidance for the development of Regulatory Guide (RG) 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." In particular, the staff developed a draft revision of the guidance related to defense-in-depth in Section 2.1 of Draft Regulatory Guide DG-1285, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis."

External stakeholder participants included representatives from the following organizations: AREVA, the Southwest Research Institute's Center for Nuclear Waste Regulatory Analyses, Curtiss-Wright, Duke Energy, Exelon, Lawrence Livermore National Laboratory, the Nuclear Energy Institute, NuScale Power, Platts, PSEG, the Pressurized-Water Reactor Owner's Group, Westinghouse, and members of the public. This public meeting was announced on May 12, 2016, on www.nrc.gov and the meeting notice was made publicly available in the NRC Agencywide Document Access and Management System (ADAMS) under accession number ML16141A825. The NRC presentation and the draft revision of Section 2.1 from DG-1285 were made publicly available in ADAMS on May 20, 2016, under accession numbers ML16141A772 and ML16140A089, respectively. The following is a summary of the presentations and discussions that occurred.

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The NRC staff presentation first provided a background summary on the prior effort to develop RG 1.174, Revision 3; discussed the differences between RG 1.174, Revision 2, and DG-1285; discussed the public comments on DG-1285 that were received back in 2012; discussed the current staff approach and staff consideration of the 2012 public comments; and the staff goals for the public meeting. During this part of the presentation, comments were made regarding the amount of time that was allowed for review of the related meeting materials before the meeting; a request that the NRC formally notice and conduct a public review and comment period for the current effort to develop RG 1.174, Revision 3; and the importance of RG 1.174 for risk-informed applications. The staff noted the comments and indicated that they would be communicated to the management team overseeing the development of RG 1.174.

The staff then began soliciting stakeholder feedback on the revised draft of Section 2.1 from DG-1285, specifically as it related to the organization of the seven defense-in-depth evaluation factors; the draft language for each factor and its associated narrative; and the use of examples to further explain the factors and how they are addressed.

Discussions on the Organization of the Seven Defense-In-Depth Evaluation Factors

The staff contrasted the organization of the defense-in-depth evaluation factors in DG-1285 with the organization in the staff's revised draft guidance for Section 2.1. Specifically, the defense-in-depth evaluation factors in DG-1285 are organized into a hierarchy that has two high-level evaluation factors and five supporting evaluation factors. The staff's revised draft guidance for Section 2.1 reorganizes the defense-in-depth evaluation factors into a list of seven factors and does not describe a hierarchy. Stakeholders provided the following feedback during this discussion:

- The staff should consider retaining the hierarchy based on previous public comments
- A given application may dictate addressing the seven factors in a hierarchical fashion and some factors may carry more weight than others in the decisionmaking process, but all factors need to be addressed
- Flexibility should be allowed when a given defense-in-depth evaluation factor is not applicable.

Discussion on the Descriptions of the Seven Defense-In-Depth Evaluation Factors

For each of the seven defense-in-depth evaluation factors, the staff presented the revised draft language in Section 2.1 and discussed the revisions with stakeholders to obtain feedback. Stakeholders provided the following feedback during these discussions:

General Feedback on the Defense-in-Depth Evaluation Factors:

- The defense-in-depth evaluation factors should address temporary conditions and flexibility should be allowed for such cases.
- Addressing the seven defense-in-depth evaluation factors needs to be in the context of an application.
- A tentative date of June 10, 2016, was identified for when industry comments could be provided to the NRC for consideration and NRC staff emphasized that comments on the revised draft are welcome at any time before or after.

Feedback on Factor 1 – Preserve a reasonable balance among the four layers of defense:

- The staff should further expand the description in the narrative.
- Factor-specific examples may help better explain the narrative.
- The Vermont-Yankee extended power uprate application, which takes credit for containment accident pressure, may be a good example to help explain this factor.
- There is concern that this factor can be interpreted differently by probabilistic risk analysts and deterministic analysts.

Feedback on Factor 2 – Preserve adequate capability of design features without over-reliance on programmatic activities as compensatory measures:

- Stakeholders expressed concern about how this factor would work with an application related to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.69.
- The staff needs to develop guidance on how this factor would be addressed in an application
- An entire application should not be denied based on how this factor is addressed.
- Similar to Factor 1, stakeholders expressed concern that this factor can be interpreted differently between probabilistic and deterministic analysts. This concern may also relate to the NRC Standard Review Plan.

Feedback on Factor 3 – Preserve sufficient system redundancy, independence, and diversity:

- This factor should be modified to express the concept of introducing a new single failure mode with the licensing basis change.
- Not entering into a condition that is not already disallowable by technical specifications
- This should be revised to include consideration and/or allowance of temporary conditions
- As written, this evaluation factor would not allow a change to be made to a given system without installing another system that performs the same function.
- Additional clarification is needed on the meaning of the term sufficient.

Feedback on Factor 4 – Preserve adequate defense against potential common-cause failures (CCFs) and assess the potential for the introduction of new CCF mechanisms:

- Additional clarification is needed to explain the intent of this factor. For example, is this factor intended to apply to all common cause failures (CCFs) or only as it relates to CCFs that impact multiple layers of defense?
- Insights from the Organisation for Economic Cooperation and Development / Nuclear Energy Agency Greenbook should be considered, as related to this factor.
- The language in this evaluation factor appears to be more suggestive of the meaning of CCF in the context of a probabilistic risk assessment as opposed to a more general higher-level meaning.
- The staff should consider how this evaluation factor has been interpreted in the past.

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- It is unclear whether this factor should be specifically related to introducing a new CCF mode.
- The staff should consider integrating the probabilistic and deterministic meanings of CCF in this evaluation factor.
- The staff should consider qualifying the term “increase,” such as a “substantial” increase.

Feedback on Factor 5 – Maintain integrity of multiple fission product barriers:

- The staff should consider clarifying that this evaluation factor applies within the layer of defense related to containment of the source term.
- The staff should think about what it means to significantly degrade a layer defense. For example, how does the change impact defense-in-depth when the existing licensing basis is already consistent with defense-in-depth?

Feedback on Factor 6 – Preserve sufficient defense against human errors:

- This factor should not preclude a licensing basis change that creates a new operator action. Increase is relative to the base risk.
- Given that plants have not been licensed based on the need for operator action early during the course of an accident, it is unclear how a change that would have precluded the initial licensing of the plant would be handled.
- It was pointed out that there are two aspects to this factor; a probabilistic-related portion that relates to human reliability analysis and a traditional deterministic portion that relates to human factors engineering.
- The staff should be mindful of the choice of terms that have been used in other contexts, such as using the term “defenses” as related to new operator actions.

Feedback on Factor 7 – Maintain the intent of the plant’s design criteria:

- The original intent of this evaluation factor is unclear, i.e., whether this evaluation factor was this intended to be a catch-all in cases where none of the other factors applied?
- This factor should be evaluated in terms of what equipment is remaining, not what equipment was lost.
- It is unclear how an application that affects a general design criterion (GDC) would be handled.
- Clarification is needed regarding where a regulation is met versus a GDC.
- Licensees should not be penalized for exercising flexibility that is allowed by a given program.
- The staff should provide additional context for this evaluation factor.
- It is unclear what this factor is intended to address that would not already be addressed by the first principle of the Risk-Informed Decisionmaking.
- If a plant’s design criteria are impacted by a licensing basis change, it is unclear what the licensee should do to address the impact and what level of impact warrants action.

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Discussion on Using Examples to Explain the Seven Defense-In-Depth Evaluation Factors

NRC staff sought feedback on how examples should be used to explain the seven defense-in-depth evaluation factors. A number of examples were developed for each of five of the defense-in-depth evaluation factors in DG-1285 that were intended to further explain the meaning of those five factors. The staff asked for feedback on whether such factor-specific examples should be developed, whether one or more integrated examples should be developed that demonstrate the process of addressing all of the factors, or some combination of both of these scenarios

- Both factor-specific and integrated examples are favored to further explain the meaning of each factor and demonstrate the process of addressing multiple factors, respectively.
- Examples should be “tough” examples that require some thought.
- Applications related to a 10 CFR 50.69 application or a Technical Specification Initiative 4B – Risk-Managed Technical Specifications – might be ideal for integrated examples.

Additional Stakeholder Feedback

In addition to the specific feedback on the defense-in-depth evaluation factors, stakeholders provided the following additional feedback:

- Stakeholders expressed appreciation for being engaged early on during the process of revising the guidance in DG-1285; however, concern was expressed over needing more time to make sure they are able to engage the right people that can provide appropriate feedback.
- Regarding planning for an August workshop, the staff should be sure to solicit stakeholders for inputs to be considered on scheduling to help ensure that appropriate individuals are available.
- A request was made to have the revised DG-1285 noticed in the Federal Register for a formal public review and comment period and that, without doing so, there is a concern staff may exercise wide latitude in addressing informally submitted comments.
- Given that four years have elapsed since DG-1285 was issued for public review and comment and that a significant amount of work has been performed related to defense-in-depth during that four-year period, the staff need consider that work appropriately.
- Industry stakeholders requested that more advanced notice be given for public meetings and that the related meeting materials be provided further in advance of future meetings.
- There is a concern that the current project schedule for RG 1.174, Revision 3, does not allow enough time to appropriately engage the public and that performing this work expediently is not a success path for the project.

- There are several risk-informed initiatives in progress and resource availability for this work is an issue. To this end, the RG 1.174, Revision 3, schedule should be vetted with the Risk-Informed Steering Committee so that they can help provide direction on where industry should be directing its resources.

Enclosures:

1. List of Meeting Attendees
2. Meeting Presentation (ADAMS Accession No. ML16141A772)
3. Draft Revision of Section 2.1 for RG 1.174, Revision 3 (ADAMS Accession No. ML16140A089)

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ADAMS Accession No.:ML16169A342

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