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Biff Bradley
DIRECTOR
RISK ASSESSMENT
NUCLEAR GENERATION DIVISION

August 13, 2012

Ms. Cindy Bladey
Chief, Rules, Announcements, and Directives Branch (RADB)
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Industry Comments on Four Draft Regulatory Guides on Risk-Informed Decisions on Plant-Specific Licensing Basis Changes (Federal Register dated May 17, 2012; 77 FR 29391; Docket ID NRC-2012-0110)

Project Number: 689

Dear Ms. Bladey:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)[1] is pleased to offer comments on four draft regulatory guides regarding risk-informed licensing basis changes issued for public comment in the subject *Federal Register* notice:

- DG–1285, "An Approach for Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," (proposed Revision 3 of Regulatory Guide 1.174)
- DG–1286, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Inservice Testing," (proposed Revision 1 of Regulatory Guide 1.175)
- DG-1287, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications" (proposed Revision 2 of Regulatory Guide 1.177)
- DG–1288, "An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping" (proposed Revision 2 of Regulatory Guide 1.178)

[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

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1776 I Street, NW | Suite 400 | Washington, DC | 20006-3708 | P: 202.739.8083 | F: 202.533.0107 | reb@nei.org | www.nei.org

Template = ADM-013

Add = R. Carpenter (rgc1)
M. Case (mjc)

Comments on these draft regulatory guides were requested by June 29, 2012; that comment period was later extended to August 13, 2012. Specific comments on DG-1285, DG-1286, and DG-1288 are included in Attachments 1, 2, and 3, respectively. Although there are no specific comments on DG-1287, many of the comments related to defense-in-depth in DG-1285 are applicable to all of the draft regulatory guide revisions, and any changes should be consistent across all four of these draft regulatory guides. Consistency in this area is vital, as these changes to the language regarding defense-in-depth are the most extensive revisions made to these draft regulatory guides.

In particular, in DG-1285, Section 2.1 "Evaluation of Defense-in-Depth Attributes and Safety Margins" was changed substantially. Though the revised language offers many improvements, it still lacks clarity regarding when defense-in-depth is most important, how to use insights from PRA to guide the assessment of defense-in-depth, and how to integrate the assessment of defense-in-depth with the assessment of the other principles. Additionally, the examples provided, while promising, could be better developed and more illustrative of the defense-in-depth principles, which could improve consistency in conduct of defense-in-depth assessments.

Given the importance of the defense-in-depth principle in risk-informed regulation, the industry believes that additional discussion on this topic at a public meeting prior to finalization of these documents would be beneficial.

Should you have any additional questions, please contact me or Victoria Anderson (202-739-8101; vka@nei.org).

Sincerely,

Biff Bradley

Attachments

c: Mr. Thomas H. Boyce, RES/DE/RGDB, NRC
Mr. Robert G. Carpenter, OE/EB, NRC
Ms. Mary T. Drouin, RES/DRA/PRB, NRC
Mr. Joseph C. Giitter, NRR/DRA, NRC

Specific Comments on DG-1285 (Draft RG 1.174, Rev. 3)

The regulatory guide (RG) would benefit from incorporating some of the material in the Standard Review Plan (SRP) Section 19.2 as discussed below. It should be made clear that, since the focus of the RG is on applications of a risk-informed argument to propose changes to the licensing basis, it is based on the presumption that the as-built, as-operated plant, prior to the change, is consistent with the defense-in-depth (DID) philosophy, in that:

- a reasonable balance between the levels of protection has been established
- effectiveness (of the barriers) is ensured by conformance with design standards and regulations
- administrative procedures and controls are in place to preserve the defenses.

This is recognized in the SRP Section 19.2, where it states:

"In maintaining consistency with the defense-in-depth philosophy, the proposed license amendment should not result in any substantial change in the effectiveness of the barriers. Consequently, reviewers should consider the following objectives to ensure that the proposed change maintains appropriate safety within the defense-in-depth philosophy:

- The change does not result in a significant increase in the existing challenges to the integrity of the barriers.
- The proposal does not significantly change the failure probability of any individual barrier.
- The proposal does not introduce new or additional failure dependencies among barriers that significantly increase the likelihood of failure compared to the existing conditions.
- The overall redundancy and diversity among the barriers is sufficient to ensure compatibility with the risk acceptance guidelines."

While what is meant by "significant" in the first three bullets is not specified, the last bullet (essentially principle 4) provides the means for confirming that any changes addressed by the first three bullets are not significant.

Thus, an important aspect of addressing DID is that the licensee has an understanding of the barriers, their role, and the means by which they are achieved. The SRP elaborates on one aspect of this by stating:

> "In addition to the usual quantitative risk indices, PRAs provide important qualitative results, namely, the contributors to accident sequences. For PRAs that use the fault tree linking approach, these contributors are described by the accident sequence minimal cut-sets. Each accident sequence minimal cut-set is a combination of passive

and active SSC failures and human errors that would cause core damage or a release of radioactivity. The cut-sets therefore directly show one particular aspect of defense in depth, in that they reveal how many failures must occur in order for core damage or radiological release to occur. Thus, the minimal cut-sets show the effective redundancy and diversity of the plant design.

In most cases, events that appear in each minimal cut-set are targeted by programmatic activities to ensure the reliability of the associated SSC. Specific activities that are important to maintain the reliability of a component include IST, ISI, periodic surveillance required by Technical Specifications, quality assurance, and maintenance. Therefore, when a review of the minimal cut-sets reveals areas where redundancy or diversity are already marginal, it would arguably be inappropriate to reduce the level of activities aimed at ensuring SSC performance...The objective of this review is to avoid completely relaxing the defense-in-depth posture at points at which the plant design has the least overall functional independence, redundancy, and/or diversity. On the other hand, in areas where a plant has substantial redundancy and diversity, defense-in-depth arguments used to justify relaxations should be given appropriate weight."

The above text illustrates how the insights from the PRA can be used to inform the discussion of DID, and a similar discussion would be a useful addition to the RG.

In addition to the changes related to the DID philosophy and definition in general, the RG has been revised to include examples in Section 2.1.1.3, which addresses factors to consider when assessing changes to the way DID is implemented. Comments on these examples are as follows:

- *Item 1, "Avoid overreliance on programmatic activities as compensatory measures associated with a change to the LB"* It is not clear that the second example is a change to a programmatic activity, since any change in EOPs would need to be verified as being appropriate and feasible. The third example is not relevant since it is a change to an existing programmatic activity (inspection) and is not a compensatory measure.

- *Item 2, "Preserve sufficient system redundancy, independence, and diversity"* In the first example, it is not at all clear whether the completion time relates to the complete system or one train of the system. However, if it is already a part of the plant operating practices that the system (or the train) could be taken out of service, i.e., a Tech Spec completion time already exists, then it should have been concluded that there was sufficient defense-in-depth for this function, in that there were sufficient ways of meeting this function. The issue should be whether the change in risk by extending the completion time is acceptable, and this is addressed by the PRA evaluation for Principle 4. The second example addresses a calculation done in response to a power uprate, and the purpose of the calculation is to demonstrate that the ECCS pumps will continue to operate. The dependency between the barriers was always there – it the containment fails to hold pressure, the ECCS pumps may

fail. The third example would be a good opportunity to demonstrate under what conditions (e.g., frequency of challenge to the function, reliability of alternate means of meeting the function) the relaxation of controls might be acceptable. The increase of completion times itself is not a challenge to DID as discussed previously in relation to the first example.

- *Item 3, "Preserve adequate defense against potential CCFs and assess the potential for the introduction of new CCF mechanisms"* The first two examples are good examples of how to deal with the unknown unknown effects of changes by using principle 5, performance monitoring, and implementing the changes in a phased manner; however, the third example should have been addressed while performing the categorization.

- *Item 4, "Preserve sufficient defense against human error"*The first and third examples involve introducing new operator actions. Both examples contain the sentence: "In this situation, defenses against human error may not be preserved," however, this is not necessarily true. Certainly an additional opportunity for human error has been introduced, but if the same precautions against the occurrence of human error (e.g. procedures, training, feasibility assessment, etc.) have been implemented consistent with the significance of the response, the defenses have been preserved. It is not clear what the second example is trying to show. It involves an initial proposal of changing to a procedure which has a single critical human failure. The discussed resolution relates to a redesign of the procedure to avoid such a failure. This is certainly a way of lessening the impact of a single operator error, but the original proposal would be replaced.

- *Item 5, "Maintain the intent of the plant's design criteria"*The purpose of the example is not completely clear, however, it seems to be to discuss that while an element of the implementation of the plant's design (in this case inspection of the pressure vessel) cannot be removed, it may be modified.

The above examples should be revised with the above comments in mind to improve their clarity and better define their specific purposes.

Specific Comments on DG-1286 (Draft RG 1.175, Rev. 1)

- Section C, Subsection 2.3.1 refers to "Section 2.2.3 of Regulatory Guide 1.1 (Ref. 3)...". Reference 3 pertains to RG 1.174, not 1.1, and RG 1.174 does not have a Section 2.2.3. This should be updated.

Specific Comments on DG-1288 (Draft RG 1.178, Rev. 2)

- The third paragraph of Section A should be revised to reference ASME Code Case N-716, *Alternative Piping Classification and Examination Requirements.* Though not yet endorsed by the NRC, licensees are utilizing this code case via exemption requests, and discussion in this regulatory guide could be beneficial.
- Section C, Subsection 2.2 discusses the ASME has a PRA standard and refers to ASME RA-S-2002. It also discusses the NRC guide to provide guidance to licensees on determining the technical adequacy of a PRA, and refers to the NRC staff currently developing the regulatory guide. Up to date references to the Standard and the regulatory guide, and associated descriptive verbiage, should be provided.
- The third paragraph in Section 2.2, which discusses PRA technical adequacy, should reference EPRI TR-1021467, "*Nondestructive Evaluation: Probabilistic Risk Assessment Technical Adequacy Guidance for Risk-Informed In-Service Inspection Programs.*" This topical report, which describes an approach to demonstrating technical adequacy of a PRA supporting an RI-ISI program, is pertinent to this discussion.
- The references should be updated to include ASME Code Case N-716 as well as EPRI TR-1021467, "*Nondestructive Evaluation: Probabilistic Risk Assessment Technical Adequacy Guidance for Risk-Informed In-Service Inspection Programs*" (if added to Section 2.2 per previous comment).