

Industry Feedback on Proposed RG 1.174 Revisions

NRC Public Meeting

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Overview

- Feedback on defense-in-depth (DID) white paper
- Suggested approach to DID in RG 1.174
- Examples for discussion
- Inclusion of aggregation and treatment of uncertainty in upcoming revision

Feedback on DID White Paper

- Maintaining integrated decision making process is critical
- First factor is a high level objective, which is what has to be demonstrated
 - Guidelines should describe how to demonstrate that DID philosophy has not been degraded
- Overall criteria must be considered in an integrated manner
 - Any single criterion should not be reason to reject a risk-informed change

Feedback on DID White Paper

- Discussion on temporary changes should be a stand-alone paragraph so that it is clear that it is applicable to all criteria
- Evaluation of a risk-informed application should involve review of the change in DID, not absolute DID
 - Discussion of Layers of DID is potentially misleading
 - First layer recognizes change is acceptable as long as the effect is not significant
 - For the next 3 layers use of the term maintain could be interpreted as no change is acceptable rather than no significant change
 - Factor 7 is unnecessary and should be deleted
 - Some change in DID implementation is acceptable

Suggested Approach to DID in RG 1.174

- Describe the philosophy of DID and how it is implemented
- Clearly state presumption that the as-built, as-operated plant, prior to the change, is consistent with the DID philosophy
- Give intermediate level acceptance guidelines, such as what is included in the standard review plan
 - LAR should demonstrate that the proposed change maintains appropriate safety within the DID 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
- Include examples regarding the application of DID and safety margin in RG 1.174 in an attachment
 - Examples should involve a complete treatment of a risk-informed decision related to a licensing action

Example 1: BTP 8-8

BTP 8-8: Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions

- “The purpose of this Branch Technical Position (BTP) is to provide guidance from a deterministic perspective in reviewing such amendment requests.”
- “A supplemental power source should be available as a backup to the inoperable EDG or offsite power source, to maintain the defense-in-depth **design philosophy** of the electrical system to meet its intended safety function. The supplemental source must have capacity to bring a unit to safe shutdown (cold shutdown)¹ in case of a loss of offsite power (LOOP) **concurrent with a single failure** during plant operation (Mode 1).”
- “According to NUREG-1784 [Reference 4], considering the changes in electric grid performance post-deregulation, **the duration of LOOP events has increased and the probability of a LOOP as a consequence of a reactor trip has increased.**”
- “In summary, in light of the recent experiences in grid outages, it is the staff’s position that the **availability of an additional power source is a condition for approval** of the extended EDG or offsite power AOT. Therefore, a supplemental power source must be available when extending the current AOT allowed by the plant TS for a single inoperable EDG or offsite power source up to 14 days provided the extended AOT is also supported by a risk-informed evaluation.”

Example 2: SNC TSTF-500 (DC Electrical Re-Write) Application

- TSTF-500 allows for the extension of completion times (CTs) using risk-informed methods.
 - Southern Nuclear submitted TSTF-500 and included a change in the CT from two to 12 hours.
 - Reviewer believed in order to request a change to the two hour CT, licensee would need to take an additional single failure (e.g. have another battery available)
 - NRC did not approve of the CT change and SNC retracted in June 2016
- Per RG 1.177, “System redundancy, independence, and diversity are maintained commensurate with the expected frequency and consequences of challenges to the system”
 - None of these features of the DC system were affected by the proposed increase to the CT
 - Needs to be stated clearly under Factor 3 in Section 2.1.1.2 of the draft RG
 - Additional clarity could be provided if the draft RG explained that not all seven factors apply, or are even impacted by, a specific type of risk-informed change

Example 3: PSEG CFCU AOT Extension Proposed Application

- Proposal to extend allowed outage time for one or two inoperable containment fan coil units (CFCUs) from seven to 14 days
 - Adequate defense-in-depth maintained
 - Success criteria is three of five CFCU or one of two trains of Containment Spray
 - Safety margins not affected
 - Continued monitoring under the maintenance rule program and PSEG performance and predictive monitoring programs
 - Reduce risk associated with shutting down to respond to emergent issues without significant change in at-power risk

Treatment of Aggregation and Uncertainty

- Licensees are developing more external event PRA models, while continuing to address the known conservatisms in Fire PRA models
 - Issue of aggregation should be addressed in Sections 2.2.5 and 2.2.6 with this revision
 - Focus on aspects of aggregation related to
 - Decomposing PRA results to understand their level of realism/conservatism
 - Effects of uncertainty to give more guidance on how to use these insights in an integrated decision-making framework
 - Margin to QHOs
- Recognize the difference between making assumptions for convenience (e.g., as approximations) that introduce biases into the risk assessments, and true model uncertainties
 - More completely reference NUREG 1855 and companion EPRI documents