

12 PERIODIC REVIEW

Rule Reference: 10 CFR 50.69(b)(2)(iv), (d)(1) and (e). 50.69 (d)(1) and (e) are quoted below:

10 CFR 50.69 (d) *Alternative treatment requirements.*

(1) RISC-1 and RISC-2 SSCs. The licensee or applicant shall ensure that RISC-1 and RISC-2 SSCs perform their functions consistent with the categorization process assumptions by evaluating treatment being applied to these SSCs to ensure that it supports the key assumptions in the categorization process that relate to their assumed performance.

10 CFR 50.69 (e) *Feedback and process adjustment.*

(1) RISC-1, RISC-2, RISC-3 and RISC-4 SSCs. The licensee shall review changes to the plant, operational practices, applicable plant and industry operational experience, and, as appropriate, update the PRA and SSC categorization and treatment processes. The licensee shall perform this review in a timely manner but no longer than once every two refueling outages.

(2) RISC-1 and RISC-2 SSCs. The licensee shall monitor the performance of RISC-1 and RISC-2 SSCs. The licensee shall make adjustments as necessary to either the categorization or treatment processes so that the categorization process and results are maintained valid.

(3) RISC-3 SSCs. The licensee shall consider data collected in § 50.69(d)(2)(i) for RISC-3 SSCs to determine if there are any adverse changes in performance such that the SSC unreliability values approach or exceed the values used in the evaluations conducted to satisfy § 50.69(c)(1)(iv). The licensee shall make adjustments as necessary to the categorization or treatment processes so that the categorization process and results are maintained valid.

12.1 The following guidance is provided relative to paragraph 10 CFR 50.69(e)(1) above, for RISC-1, RISC-2, RISC-3, and RISC-4 SSCs

If significant changes to the plant risk profile are identified, or if it is identified that a RISC-3 or RISC-4 SSC can (or actually did) prevent a safety significant function from being satisfied, an immediate evaluation and review should be performed prior to the normally scheduled periodic review. Otherwise, the assessment of potential equipment performance changes and new technical information should be performed during the normally scheduled periodic review cycle.

Scheduled periodic reviews (e.g., once per two fuel cycles in a unit) should evaluate new insights resulting from available risk information (i.e., PRA model or other analysis used in the categorization) changes, design changes, operational changes, and SSC performance. If it is determined that these changes have affected the risk information or other elements of the

categorization process such that the categorization results are more than minimally affected, then the risk information¹ and the categorization process should be updated. This review should include:

- A review of plant modifications since the last review that could impact the SSC categorization
- A review of plant specific operating experience that could impact the SSC categorization,
- A review of the impact of the updated risk information on the categorization process results
- A review of the importance measures used for screening in the categorization process².
- An update of the risk sensitivity study performed for the categorization

In addition to the normally scheduled periodic reviews, if a PRA model or other risk information is upgraded³, a review of the SSC categorization should be performed. It is expected that risk information upgrades would normally be timed such that the upgrade would coincide with the normal periodic review schedule. However, in the case that the upgrade was performed on a separate schedule, then the review should be performed in a timely manner, and should include similar considerations as those listed above for the periodic reviews.

In most cases, the categorization would be expected to be unaffected by changes in the plant-specific risk information. However, in some instances, an updated PRA model could result in new RAW and F-V importance measures that are sufficiently different from those in the original categorization so as to suggest a potential change in the categorization. In these cases, the assessment of whether a change in categorization is appropriate should be based on the absolute value of the importance measures. The absolute importance is the product of the base CDF/LERF and the importance measure ([RAW-1] or Fussell-Vesely). This is done in order to not inadvertently assess an SSC as safety significant when its relative importance (FV and RAW) has gone up, but only due to a decrease in overall CDF & LERF. In cases where the importance measures are different between a prior categorization and an updated result, the categorization reassessments of SSCs that have been previously categorized should be based on the following table:

¹ If multiple PRAs or analyses have been used to support the categorization process, the update may be limited to the specific risk information that has been determined to have changed in a manner that would affect the categorization process

² If a review of the importance measures indicate that the SSC should be reclassified then both the relative and absolute values of the risk metrics should be considered by the IDP.

³ PRA upgrade, as defined in ASME RA-S-2002, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant applications", is as follows: *The incorporation into a PRA model of a new methodology or significant changes in scope or capability. This could include items such as new human error analysis methodology, new data update methods, new approaches to quantification and truncation, or new treatment of common cause failure.* NOTE- This means that adoption of an SPRA over a SMA would be an upgrade that requires an assessment.

Table 12-1
IMPACT OF PRA UPDATES ON CATEGORIZATION

Prior Categorization	Updated CDF/LERF	Updated Significance Based on Importance	Updated Absolute Importance	Updated Categorization
Low	Higher	Safety-Significant	Higher	Safety-Significant
Low	Reduced/Same	Safety-Significant	Higher	Safety-Significant
Safety-Significant	Reduced/Same	Low	Lower	Low
Safety-Significant	Higher	Low	Lower	Low

When a change to the categorization of an SSC is suggested either by a change in plant design or operation that would prevent a safety-significant function from being satisfied or by a change in the PRA model as determined from the absolute importance measures, they should be presented to the IDP for concurrence. In these cases, the IDP would assess the basis for the re-categorization by:

- Review of the primary technical bases for the initial categorization, including the system function(s), the risk importance and the basis for their original categorization,
- Review of the technical basis for the change (in plant design and operation of PRA model) that has resulted in a suggested change to the SSC categorization including the appropriateness of the manner in which the SSC has been reflected as a result of the change, and
- Review of the new risk importance and defense in depth implications.

The IDP has the final decision regarding the suggested re-categorization based on the IDP process described in Section 9.

12.2 The following guidance applies to phased implementation:

In addition to the above considerations for periodic review, a planned and phased implementation of SSC categorization over several years could result in later SSC categorization activities impacting earlier SSC categorization schemes. Thus, a review of the impact of the current categorization activity on previous categorizations should be performed. A determination needs to be made whether the integrated sensitivity study or the defense in depth implication considerations in previous categorizations have been changed as a result of these later categorization activities. If such changes are found, they should be presented to the IDP for consideration in their deliberations on the categorization of the latest system. This review of previous categorization may be focused to those SSCs affected by the categorization of additional functions, and does not obviate or replace the periodic review discussed in 12.1 above.

12.3 The following guidance is provided relative to paragraphs 10 CFR 50.69(d)(1) and 10 CFR 50.69(e)(2) above, for RISC-1 and RISC-2 SSCs

For initial implementation, paragraph 50.69(d)(1) is met through verification of PRA technical adequacy, as addressed through 50.69(b)(2)(ii). This ensures that a valid basis exists for the RISC-1 and RISC-2 performance credited in the categorization process. For implementation going forward, the provisions of 50.69(d)(1) and (e)(2) are met in a performance-based manner through monitoring, feedback, and updates to the PRA and/or the categorization results. RISC-1 and RISC-2 SSCs can be monitored in the same manner as they are monitored under 10 CFR 50.65, the Maintenance Rule, with the following clarifications:

- a. The monitoring should address all functional failures, not just maintenance preventable functional failures.
- b. The scoping requirements of the maintenance rule would be expected to envelop practically all RISC-1 and RISC-2 SSCs. However, to the extent that any of these SSCs are not in the maintenance rule scope, appropriate monitoring requirements should be developed for those SSCs.

As appropriate, the results of this monitoring should be used to determine if adjustments to the categorization assumptions, or treatment processes for RISC-1 and RISC-2 SSCs, are necessary.

12.4 The following guidance is provided relative to paragraph 10 CFR 50.69(e)(3) above, for RISC-3 SSCs

Paragraph §50.69(d)(2)(i) *Inspection and Testing*, states that periodic inspection and testing activities must be conducted to determine that RISC-3 SSCs will remain capable of performing their safety-related functions under design basis conditions. Data obtained from this testing is used to satisfy the provisions of §50.69(e)(3).

Paragraph §50.69(d)(2)(ii), *Corrective Action*, states that conditions that would prevent a RISC-3 SSC from performing its safety-related functions under design basis conditions must be corrected in a timely manner. For significant conditions adverse to quality, measures must be taken to provide reasonable confidence that the cause of the condition is determined and corrective action taken to preclude repetition. The primary intent of this provision is to address the possible effects of potential common cause failures and degradation mechanisms following implementation, as discussed in paragraph 50.69(b)(2)(iv).

Common cause failures are an important consideration for implementation of §50.69. Common cause failures are defined as the simultaneous failure of more than one SSC to perform its function, due to the same cause (design, maintenance, environment, etc). Common cause failure is of particular interest for standby equipment, since normal operation may not reveal the failures until the function of the equipment is demanded by an initiating event, or during testing. While the §50.69 process maintains important defenses against common cause failure, it is possible that common cause failure rates could be affected through changes in special treatment of RISC-3

SSCs. Section 8 of this document discusses how various elements of the risk categorization (base PRA model requirements, common cause risk importance measures (RAW and FV), defense-in- depth evaluation, and integrated risk sensitivity study) ensures that the potential for common cause failures for RISC-3 SSCs is appropriately considered. In addition to the categorization process itself, the requirements of the rule for RISC-3 treatment, including test and inspection (§50.69(d)(2)(i)), periodic evaluation (§50.69(e)) and corrective action (§50.69(d)(2)(ii)), provide important defenses against the potential for common cause failures going undetected.

Performance monitoring of RISC-3 SSCs, as required by 10 CFR 50.69(e)(3), is established to provide assurance that potential increases in failure rates will be detected and addressed before reaching the rate assumed in the integrated sensitivity study. Since implementation of §50.69 would allow RISC-3 SSCs to be procured with reduced special treatment, and used in multiple systems, it is important to be aware of inter-system common cause failure potential. As a means to monitor equipment performance changes, failures of RISC-3 SSCs are identified and tracked in a corrective action program. As part of the corrective action program, failures of RISC-3 SSCs are reviewed to determine the extent of condition (i.e., whether this failure is indicative of a potential common cause failure). For the purposes of assessing data from the corrective action program, failures should be assessed for groups of like component types (e.g., motor operated valves, air operated valves, motor-driven pumps, etc). The intent of the periodic review is twofold: first, to ensure that the failure rate of RISC-3 SSCs in a given time period has not unacceptably increased due to the changes in treatment. The periodic review validates that the rate of RISC-3 SSC equipment failures has not increased by a factor greater than that used in the integrated risk sensitivity study. Second, the review of component group failure data is performed to detect the occurrence of potential inter-system common cause failures, and to allow timely corrective action if necessary, as required by §50.69(d)(2)(ii). Since most RISC-3 components have low failure rates, noted increases to these rates are most readily detected through grouping of components. If failure rate increases are noted, attention should be focused to common treatment changes to groups of components to ensure that the potential for inter-system common cause failure remains low. This corrective action review should also consider previous component performance history.

This review of failure experience accounts for any changes in test frequencies, routine demands and exposure times, as appropriate. This can be accomplished by proactively assessing the documented failures in a given group of SSCs, and comparing the number of failures documented in the current review period against failures in previous periods, accounting for changes in treatment. If the number of failures for a group of SSCs exceeds a factor of two increase over the expected number of failures, a potential adverse trend is identified requiring further assessment. The factor of two is selected so to assure an assessment is initiated prior to exceeding the factor used in the risk sensitivity study (e.g., a factor of 3 to 5). The licensee should take the appropriate actions, (which could include changes in treatment or categorization), to preclude reaching unacceptable performance.