Generic RAIs Applicable to
License Amendment Request to Implement
Technical Specifications Task Force Traveler TSTF-505, Revision 2
"Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b"

RAI-1 Process for Identification and Treatment of PRA Key Assumptions and Sources of Uncertainty

Example Generic RAI. See Limerick APLA RAI-01 (ML19192A031)

Regulatory Position C of Regulatory Guide (RG) 1.174, Revision 3, (Agencywide Documents Access and Management System (ADAMS) Accession Number (No.) ML17317A256) states:

> "In risk-informed decision-making, licensing basis changes are expected to meet a set of key principles… In implementing these principles, the staff expects the following… Uncertainty receives appropriate consideration in the analyses and interpretation of findings… NUREG-1855 provides acceptable guidance for the treatment of uncertainties in risk-informed decision-making"

NUREG-1855, Revision 1 (ADAMS Accession No. ML17062A466) provides guidance on screening sources of uncertainty and determining those that are key sources of uncertainty for the application. NUREG-1855, Revision 1 identifies EPRI Topical Report (TR) 1016737 and EPRI TR 1026511 as providing additional guidance for identifying and characterizing key sources of uncertainty.

Section 2.3.4 of Nuclear Energy Institute (NEI) 06-09, Revision 0-A (ADAMS Accession No. ML12286A322), states that PRA modeling uncertainties be considered in application of the PRA base model results to the risk-informed completion time (RICT) program. The NRC Safety Evaluation (SE) for NEI 06-09, Revision 0, states that this consideration is consistent with Section 2.3.5 of RG 1.177, Revision 1 (ADAMS Accession No. ML100910008). NEI 06-09, Revision 0-A, further states that sensitivity studies should be performed on the base model prior to initial implementation of the RICT program on uncertainties which could potentially impact the results of a RICT calculation. These sensitivity studies should be used to develop appropriate compensatory Risk Management Actions (RMAs) such as highlighting risk significant operator actions, confirming availability and operability of important standby equipment, and assessing the presence of severe or unusual environmental conditions.

[***LAR statements here***]

a. Describe, separately for [***each PRA model, e.g. internal events, fire, etc.]***, the process used to identify and evaluate key assumptions and sources of model uncertainty. Address the following in the response:

   i. Discuss how a comprehensive list of plant-specific and generic industry key assumptions and sources of uncertainty were identified as a starting point for this evaluation.

   ii. Explain how the comprehensive list of key assumptions and sources of uncertainty was screened to a list of uncertainties that were specifically evaluated for their impact on the RICT application.

iii. Explain what criteria or what additional analysis was used to evaluate the impact of the key assumptions and sources of uncertainty on the RICT application.

iv. Describe how the evaluation process aligns with guidance in NUREG-1855, Revision 1, or other NRC-accepted methods.

b. In accordance with the process described in NUREG-1855, [***for each PRA model***] describe any additional sources of model uncertainty and related assumptions relevant to the application that were not provided in the LAR and describe their impact on the application results.

RAI-2 Disposition of Specific Key Assumptions and Sources of Uncertainty

Plant Specific RAI. Examples are provided in Limerick APLA RAI-02 (ML19192A031) or Farley RAI 08 (ML19072A027).

The NRC SE for NEI 06-09 states:

> "When key assumptions introduce a source of uncertainty to the risk calculations (identified in accordance with the requirements of the ASME standard), TR NEI 06-09, Revision 0, requires analysis of the assumptions and accounting for their impact to the RMTS [risk-managed technical specifications] calculated RICTs."

a. Regarding the uncertainty associated with ***[describe uncertainty],*** the disposition in LAR Table **[*specify Table number]*** states that **[*identify the LAR statement that necessitates more information*].** Address the following:

   i. Identify the Limiting Conditions for Operation (LCOs) proposed to be included in the RICT program for which ***[describe the uncertainty or assumption*]** affects the RICT.

   ii. Provide the results of a sensitivity study of the impact on RICTs of this assumption to ***[describe the uncertainty or assumption].*** Discuss the results of this sensitivity study in the context of the RICT estimates provided in Table E1-2 of Enclosure 1 of the LAR.

   iii. Describe the RMAs to be implemented for applicable RICTs and provide justification that these RMAs minimize the potential adverse impact on the RICT.

RAI-3 Configuration Risk Management Program

Example Generic RAI. See Limerick APLA RAI-04 (ML19192A031).

Regulatory Position 2.3.3 of RG 1.174, Revision 3, states that the level of detail in the PRA should be sufficient to model the impact of the proposed licensing basis change. The characterization of the problem should include establishing a cause-effect relationship to identify portions of the PRA affected by the issue being evaluated. Full-scale applications of the PRA should reflect this cause-effect relationship in a quantification of the impact of the proposed licensing basis change on the PRA elements.

Section 4.2 of NEI 06-09, Revision 0-A, describes attributes of the configuration risk management tool (CRM). A few of these attributes are listed below:

- Initiating events accurately model external conditions and effects of out-of-service equipment.
- Model translation from the PRA to a separate CRM tool is appropriate; CRM fault trees are traceable to the PRA. Appropriate benchmarking of the CRM tool against the PRA model shall be performed to demonstrate consistency.
- Each CRM application tool is verified to adequately reflect the as-built, as-operated plant, including risk contributors which vary by time of year or time in fuel cycle or otherwise demonstrated to be conservative or bounding.
- Application specific risk important uncertainties contained in the CRM model (that are identified via PRA model to CRM took benchmarking) are identified and evaluated prior to use of the CRM tool for Risk Managed Technical Specifications (RMTS) applications.
- CRM application tools and software are accepted and maintained by and appropriate quality program.
- The CRM tool shall be maintained and updated in accordance with approved station procedures to ensure it accurately reflects the as-built, as-operated plant.

Enclosure **[*number*]** of the LAR describes the attributes of the CRM model for use in RICT calculations. [***explain what LAR states***]. With regards to development and application of the CRM model, provide the following:

a. Explain how any changes in success criteria based on seasonal variations are accounted for in the CRM model for use in RICT calculations.

b. Confirm that out-of-service equipment will be properly reflected in the CRM model initiating event models as well as in the system response models.

c. Describe the process that will be used to maintain the accuracy of any pre-solved cutsets with changes in plant configuration.

d. Describe the benchmarking activities performed to confirm consistency of the CRM model to base PRA model results, including periodicity of CRM model updates compared to the base PRA model updates.

RAI-4 Identification of Compensatory Measures and Risk Management Actions (RMAs)

Example Generic RAI. See Limerick APLA RAI-05 (ML19192A031).

The NRC SE for NEI 06-09, Revision 0-A, states that the LAR will describe the process to identify and provide compensatory measures and RMAs during extended Completion Times. **[*Describe what LAR states, for example, LAR Enclosure 12 identifies three kinds of RMAs (i.e., actions to provide increased risk awareness and control, reduction of the duration of maintenance activities, and reduction of the magnitude of risk increase). LAR Enclosure 12 also provides examples of RMAs for specific LCO. LAR Enclosure 12 does not describe what criteria or insights (e.g., important fire areas, important operator actions) are used to determine what RMAs to apply in specific instances.]*** Therefore:

a. Describe the criteria and insights (e.g., important fire areas, important operator actions) that are used to determine the compensatory measures and RMAs to apply in specific instances.

b. Explain how RMAs are identified for emergent conditions in which the extent of condition evaluation for inoperable SSCs is not complete prior to exceeding the Completion Time to account for the increased possibility of a common cause failure (CCF). Include explanation of if and how these RMAs are different from other RMAs.

RAI-5 Evaluation of Common Cause Failure for Planned Maintenance

Example Generic RAI. See Limerick APLA RAI-06 (ML19192A031).

NEI 06-09, Revision 0-A, states that no common cause failure (CCF) adjustment is required for planned maintenance. The NRC SE for NEI 06-09, Revision 0, is based on conformance with RG 1.177, Revision 1. Specifically, SE Section 2.2 states that, "specific methods and guidelines acceptable to the NRC staff are […] outlined in RG 1.177 for assessing risk-informed TS changes." SE Section 3.2 further states that compliance with the guidance of RG 1.174, Revision 1, and RG 1.177, Revision 1, "is achieved by evaluation using a comprehensive risk analysis, which assesses the configuration-specific risk by including contributions from human errors and common cause failures."

The guidance in RG 1.177, Revision 1, Section 2.3.3.1, states that, "CCF modeling of components is not only dependent on the number of remaining in-service components but is also dependent on the reason components were removed from service (i.e. whether for preventative or corrective maintenance)." In relation to CCF for preventive maintenance, the guidance in RG 1.177, Appendix A, Section A-1.3.1.1, states:

> If the component is down because it is being brought down for maintenance, the CCF contributions involving the component should be modified to remove the component and to only include failures of the remaining components (also see Regulatory Position 2.3.1 of Regulatory Guide 1.177).

According to RG 1.177, Revision 1, if a component from a CCF group of three or more components is declared inoperable, the CCF of the remaining components should be modified to reflect the reduced number of available components in order to properly model the as-operated plant.

a. Explain how CCFs are included in the PRA model (e.g., with all combinations in the logic models as different basic events or with identification of multiple basic events in the cut sets);

b. Explain how the quantification and/or models will be changed when, for example, one train of a 3×100 percent train system is removed for preventative maintenance and describe how the treatment of CCF meets the guidance in RG 1.177, Revision 1, or meets the intent of this guidance when quantifying a RICT.

RAI-6 Common Cause Failure for Emergent Conditions

Example Generic RAI. See Limerick APLA RAI-07 (ML19192A031)

Technical Specifications (TS) Administrative Section [***number***], constraint d states:

> For emergent conditions, if the extent of condition evaluation for inoperable structures, systems, or components (SSCs) is not complete prior to exceeding the ACTION allowed outage time, the RICT shall account for the increased possibility of common cause failure (CCF) by either:
>
> 1. Numerically accounting for the increased possibility of CCF in the RICT calculation; or
>
> 2. Risk Management Actions (RMAs) not already credited in the RICT calculation shall be implemented that support redundant or diverse SSCs that perform the function(s) of the inoperable SSCs, and, if practicable, reduce the frequency of initiating events that challenge the function(s) performed by the inoperable SSCs.

Regarding option 1 of constraint d, provide the following:

a. Describe and justify how the numerical adjustment for increased possibility of CCF will be performed, or

b. Confirm that numerically accounting for the increased possibility of CCF in the RICT calculation will be performed in accordance with RG 1.177, Revision 1.

RAI-7 Modeling of Instrumentation and Control

Example Generic RAI. See Limerick APLA RAI-08 (ML19192A031).

The proposed TS limiting conditions for operations (LCOs) include those related to instrumentation and controls (I&C).

PRA technical acceptability attributes are provided in Section 2.3.4 of NEI 06-09, Revision 0-A, and in RG 1.200, Revision 2. The LAR does not address whether the I&C is modeled in sufficient detail to support implementation of TSTF-505, Revision 2 (ADAMS Accession No. ML18183A493). The following additional information is requested:

a. Explain how instrumentation is modelled in the PRA. This should include, but not be limited to, the scope of the I&C equipment (e.g., channels, relays, logic) and associated TS functions for which a RICT would be applied, and PRA modeling of the I&C and functions including how these are modeled in sufficient detail and based on plant-specific data, etc.

b. Section 2.3.4 of NEI 06-09, Revision 0-A, states that PRA modeling uncertainties be considered in application of the PRA base model results to the RICT program. The NRC SE for NEI 06-09, Revision 0, states that this consideration is consistent with Section 2.3.5 of RG 1.177, Revision 1. NEI 06-09, Revision 0-A, further states that sensitivity studies should be performed on the base model prior to initial implementation of the RICT program on uncertainties which could potentially impact the results of a RICT calculation and that sensitivity studies should be used to develop appropriate compensatory RMAs.

   Regarding digital I&C, NRC staff notes the lack of consensus industry guidance for modeling these systems for plant PRAs to be used in risk-informed applications. In addition, known modeling challenges exist due to the lack of industry data for digital I&C components and the complexities associated with modeling software failures including common cause software failures. Given these needs and challenges, if the modeling of digital I&C system is included in the CRM model, then address the following:

   i. Provide the results of a sensitivity study on the SSCs in the RICT program demonstrating that the uncertainty associated with modeling the digital I&C system has inconsequential impact on the RICT calculations.

   ii. Alternatively, identify which LCOs are determined to be impacted by the digital I&C system modeling for which RMAs will applied during a RICT. Explain and justify the criteria used to determine what level of impact to the RICT calculation required additional RMAs.

RAI-8 Modeling of the Reactor Coolant Pump (RCP) Shutdown Seals (PWRs)

Example Generic RAI (PWR). See Farley NRC RAI 05 (ML19072A027).

[***Statements on any docketed information***]
The PRA model for the Generation III Seals was approved by the NRC in the final safety evaluation of Topical Report (TR) PWROG-14001-P, Revision 1, "PRA Model for the Generation III Westinghouse Shutdown Seal," dated the August 23, 2017 (ADAMS Accession No. ML17200C875).

Consistent with the guidance in RG 1.174, Revision 3, that the PRA scope, level of detail and technical acceptability be based on the as-built and as-operated and maintained plant, and reflect operating experience at the plant, please address the following:

a. Clarify what kind of seals are installed in each RCP in [***plant] [units]*** and whether the current [list applicable PRA models, e.g. internal events, fire, etc.] include credit for the Westinghouse Generation III ("SHIELD") RCP seals.

b. If [***any PRA model, e.g. internal events, fire, etc***.] include credit for the Westinghouse Generation III RCP seals, address the following:

    i. Confirm that the limitations and conditions in the NRC safety evaluation for PWROG-14001-P, Revision 1, are met.

    ii. If exceptions to the limitations and conditions exist, identify all the exceptions and justify their impact on the application.

    iii. Clarify whether the Generation III Westinghouse RCP seal model has been peer-reviewed as part of the internal events PRA and fire PRA peer-reviews.

    iv. If this RCP seal model has not been peer reviewed, justify why the addition of this model is not considered a PRA upgrade requiring a focused-scope peer review.

    v. If the addition of RCP seal model qualifies as a PRA upgrade, provide the results from the focused-scope peer review including the associated Facts and Observations (F&Os) and their resolutions.

RAI-9 PRA Modeling of LCO Conditions

Plant Specific RAI. Examples in Limerick APLA RAI-09 and RAI 10 (ML19192A031) or Farley RAI 13 or 14 (ML19072A027).

Regulatory Position 2.3.3 of RG 1.174 states that the level of detail in the PRA should be sufficient to model the impact of the proposed licensing basis change. The characterization of the problem should include establishing a cause-effect relationship to identify portions of the PRA affected by the issue being evaluated. Full-scale applications of the PRA should reflect this cause-effect relationship in a quantification of the impact of the proposed licensing basis change on the PRA elements.

The SE for NEI 06-09 states that a RICT can be applied to SSCs that are either modeled in the PRA, or whose impact can be quantified using conservative or bounding approaches. It further specifies that the LAR is to provide a comparison of the TS functions to the PRA modeled functions and that sufficient justification is to be provided to show that the scope of the PRA model is consistent with the licensing basis assumptions. Consistent with the guidance, Item 11 in Section 2.3 of TSTF-505, Revision 2, states:

> "The traveler will not modify Required Actions for systems that do not affect core damage frequency (CDF) or large early release frequency (LERF) or for which a RICT cannot be quantitatively determined."

Address the following:

a. For LCO ***[number and description***], LAR states [***LAR statement***].

   i. If [***system***] is not modeled in the PRA, justify why this condition can be included in the scope of the RICT program, consistent with the guidance in NEI 06-09 Revision 0-A.

Or

   ii. Explain how [***system or component***] is modeled in the CRMP model supporting the RICT program and how a change in CDF and/or LERF can be calculated for the RICT estimate.

RAI-10 Potential Credit for FLEX Equipment or Actions

Generic RAI to be developed.

For reference see Limerick APLA RAI-03 with the follow up APLA RAI 3.01 (ML19192A031 and ML19344A033).