NRR-PMDAPEm Resource

From: Klett, Audrey
Sent: Thursday, April 14, 2016 11:15 AM
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Cc: 'Gary.Kilby@fpl.com'; Cross, William (WILLIAM.CROSS@fpl.com); 'Hanek, Olga' (Olga.Hanek@fpl.com)
Subject: Request for Additional Information re. Turkey Point 3 & 4 LAR-236 (CACs MF5455 & MF5456)

Hi Mitch,

By application dated December 23, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15029A297), Florida Power & Light Company (FPL, the licensee) submitted License Amendment Request (LAR) No. 236 for Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point). The proposed amendments would revise the Technical Specifications (TSs) to Implement TS Task Force (TSTF)-505, Revision 1, "Provide Risk-Informed Extended Completion Times RITSTF [Risk-Informed TSTF] Initiative 4b."

The U.S. Nuclear Regulatory Commission's (NRC's) Instrumentation and Control Branch (EICB) and Probabilistic Risk Assessment (PRA) Licensing Branch (APLA) staff reviewed the application and identified areas where it needs additional information to support its review. The staff's request for additional information (RAI) is provided below. As discussed with Mr. William Cross of the licensee's staff on April 12, 2016, the NRC is requesting the licensee to respond to the RAI within 60 calendar days of the date of this email (April 14, 2016).

EICB RAIs

TSTF-505 generally allows two types of changes to TSs: (1) using risk-informed completion times (RICTs) for some existing actions, and (2) allowing operation in a condition where two or more redundancies are TS INOPERABLE so long as one or more redundancies is PRA Functional and there is not a total loss of function. The questions below are mainly concerned with the second of these two types of changes.

EICB RAI 1

General Background: A nuclear power plant (NPP) control system controls plant operations within parameters required by the safety analysis report (SAR) using both manual and automatic means. When NPP operation exceeds monitored parameters and enters into an unsafe condition as a result of control system failure or through operational error, the NPP protection system is designed to restore the plant to a safe state. Control system failure is mitigated by the protection system, whereas the protection system cannot be tolerated to fail and, therefore, it is designed to meet the single failure criterion, among other criteria. In summary, improper operation or failure must be mitigated by the protection system even when the protection system is degraded by a single failure.

Westinghouse-Specific Background: NPPs, including Westinghouse plants, may share protection system parameter inputs between both reactor protection and control systems. Regulatory requirements for sharing equipment and parameter inputs essentially prescribe that additional redundancy or additional design features must be designed into the protection system when there is equipment shared between protection and control systems. In addition, IEEE 279-1971, Clause 4.7.1 requires that shared equipment must be classified as part of the protection system, and Clause 4.7.3 requires that the any failure of shared protection and control equipment must be mitigated by the protection system even when the remaining portions of the protection system are degraded by a single failure (i.e., treating the failure of the shared equipment as the event that must be protected against). Generally, Westinghouse Technical Specifications (TSs) limit the time a plant is

allowed to operate with one required instrument channel inoperable in either the reactor trip system (RTS) or engineered safety features actuation system (ESFAS) or both. The TS condition remedial action has been determined to be consistent with SAR design criteria and supporting analyses.

The licensee's LAR for adoption of TSTF-505 proposes to allow plant operation in a condition where two or more RTS and ESFAS instrumentation channels are inoperable, potentially coupling protection and control systems, and potentially creating the possibility of a new or different kind of accident, anticipated operational occurrence, or condition requiring protective action (i.e., events). The staff needs additional information to understand how: (1) no new events requiring protection exist in the proposed new conditions, (2) all original events are protected against, and (3) PRA modeling adequately addresses protection and control interactions.

A. For the RTS and ESFAS functions addressed by this LAR, please identify all of the instances where equipment or information is shared between protection and control systems.

B. For each instance, please state whether extra redundancy or a design feature is used to address the "Separation of Protection and Control" criteria.

C. Please describe how each design features eliminates the need for extra redundancy, and how each behaves when there are a reduced number of redundancies.

EICB RAI 2

IEEE 279, Clause 3 states:

> The design basis shall document as a minimum … The minimum number and location of sensors required to monitor adequately, for protective purposes, those variables…that have spatial dependence.

The Model Application to TSTF-505, Revision 1, Enclosure 1 states:

> The licensee lists each TS Required Action to which the RICT Program may be applied and, for each Required Action, describes the corresponding SSC and associated function modeled in the PRA. This is to include the applicable success criteria used in the PRA model compared to the licensing basis criteria, and if applicable a disposition of any differences which justifies use of the PRA success criteria when calculating RICTs.

A. Please identify all RTS & ESFAS variables (associated with this LAR) that have spatial dependence.

B. Please explain how special dependency is accounted for in the determination of probabilistic risk assessment (PRA) Functional or "loss of function" of the associated sensors.

Note: Section 3.2.3 of NRC-approved Topical Report (TR) NEI 06-09, "Risk Informed Technical Specifications Initiative 4b: Risk Managed Technical Specification (RMTS)," Revision 0-A (ADAMS Accession No. ML12286A322) states:

> If a degraded or nonconforming condition existing on a component can be explicitly modeled by the station's PRA, then a situation specific RICT can be calculated. In these cases the PRA analysis supporting the RICT calculation must be documented, retrievable, and able to be referenced using normal operator documentation mechanisms (e.g., Control Room Logs or other equivalent methods). In the RICT calculation, equipment PRA functionality may be considered. The evaluation for the applicability of crediting "PRA functionality" shall be conducted in accordance with the guidance provided in Item 11 of Section 2.3.1. This guidance is intended to address separate operability and PRA functionality assessments which would allow a component to be considered both inoperable and PRA functional based on an evaluation of the same degraded condition.
> …

> If the condition causing a component to be inoperable is not modeled in the PRA, and the condition has been evaluated and documented in the RMTS program as having no risk impact, then the RICT may be calculated assuming availability of the inoperable component and its associated system, subsystem or train. If there is no documented basis for exclusion, or if the condition was screened as low probability, then the inoperable component must be considered not functional.

EICB RAI 3

The LAR does not describe conditions where instrumentation & controls (I&C) functions are INOPERABLE but PRA Functional.

A. For each I&C function where there is a proposed ACTION for the condition where there are two or more INOPERABLE redundancies, please provide some example conditions that would be considered PRA Functional.

B. For each example, please include an evaluation against the criteria in NEI 06-09 Section 2.3.1, Item No. 10 (i.e., Item No. 11 as augmented and supplemented by Section 3.2.3).

C. The staff understands that by meeting the criteria in Items Nos. 10 and 11 in NEI 06-09, Section 2.3.1, all design basis events would be protected against. Please identify if there are any associated design basis events that are NOT protected against when the criteria in Items Nos. 10 and 11 in NEI 06-09, Section 2.3.1 are met.

EICB RAI 4

NEI 06-09 Rev. 0-A states that a RICT cannot be used in a condition where there is a total loss of TS specified safety function; however, the LAR does not describe how it will be determined if there is a total loss of safety function.

For each I&C function where there is a proposed ACTION for the condition where there are two or more INOPERABLE redundancies, please describe the process of how it will be determined if there is a total loss of TS specified safety function.

EICB RAI 5

Enclosure 1 of the Model Application (ADAMS Accession No. ML12032A065) for licensee adoption of TSTF-505, Revision 1, states:

> This enclosure [Enclosure 1, "List of Revised Required Actions to Corresponding PRA Functions"] should provide a description of PRA functionality for each associated specified safety function that corresponds to each proposed Required Action that is applicable when all trains of equipment are inoperable as discussed in Section 2.3.1.10 of NEI 06-09. For example, the number and identity of instrumentation and control channels (or functions) required to be PRA functional is highly dependent on the specific plant and associated equipment design.

Enclosure 1 guidance is included as part of the model application because the NRC staff seeks clarity in how PRA Functional will be used during full power operation following a "loss of a specified safety function or inoperability of all required trains or divisions of a system."

In the LAR, Enclosure 1, "List of Revised Required Actions to Corresponding PRA Functions," the "PRA Success Criteria" is indicated as being the same as the "Design Success Criteria," that is, the same minimum number of channels actuate.

A. Please confirm that the PRA Success Criteria ensures all associated design basis events are protected against in the condition where two or more redundancies are INOPERABLE, or justify how adequate protection is maintained, if not.

B. Enclosure 1 of the LAR identifies some I&C structure, system, and components that are not modeled in the PRA. Item No. 11 in NEI 06-09, Section 2.3.1 includes criteria for determining PRA Functionality of components, and these criteria were developed based on the assumption that the function would be modeled in the PRA.

   I. Please describe how PRA Functionality of these un-modeled items will be determined (i.e., how the criteria of Item No. 11 will be applied).

   II. Please describe how PRA Functionality of surrogate and bounding models will be determined (i.e., how the criteria of Item No. 11 will be applied).

EICB RAI 6

For each FUNCTIONAL UNIT in TS Tables 3.3-1 & 3.3-2 (addressed by this LAR), please identify the minimum number of channels that must be OPERABLE or PRA Functional for there not to be a total loss of TS specified safety function.

APLA RAIs

APLA RAI 1 – Internal events PRA

The internal events peer review results from the 2002 Peer-Review in Table 1 of the LAR includes facts and observations (F&Os) labeled AS-1, AS-2, AS-3, and AS-9 (Table 1 does not include the corresponding Supporting Requirements (SR) for the F&Os) that identify a number of success criteria that were either not properly modelled in the PRA or were not properly developed. The disposition of these F&Os all indicate that additional evaluation was performed and the PRA was sometimes changed. The status of all the F&Os is assigned “closed.” The NRC staff notes that the only currently accepted F&O closure path is the use of the Peer Review process (i.e., subsequent peer review on the same SR as covered in the F&O). It is important to have accurate success criteria when calculating RICTs and when using “PRA Functional.”

A. Summarize how the post 2002 Peer-Review success criteria evaluations were performed and documented against the ASME/ANS RA-Sa-2009 PRA Standard.

B. Clarify how the review conducted on the new success criteria evaluations is consistent with current peer review guidance.

APLA RAI 2 – Fire PRA

The results of the fire PRA peer review given in Table 2 of the LAR are the same as given in Table V-3 of the NFPA 805 transition LAR. The NRC staff review of the NFPA 805 LAR resulted in a number of RAIs on the disposition of the fire PRA F&Os for the NFPA 805 application. At the conclusion of the NFPA 805 fire PRA review, the response to NFPA PRA RAI 29 under letters dated April 4, 2014 (ADAMS Accession No. ML14113A176), and July 18, 2014 (ADAMS Accession No. ML14213A078), summarized a variety of method and model changes that were required to use only acceptable methods in the final NFPA 805 fire PRA. Is the fire PRA that will be used to support the RICT calculations the same fire PRA that was determined to be acceptable for the NFPA 805 transition and future self-approval? How does the licensee’s maintenance and change process ensure that the latest model of record used in the RICT program reflects the as-built, as-operated plant?

APLA RAI 3 – TS Limiting Conditions of Operation (LCOs) 3.6.1.7, 3.6.1.3, and 3.6.4

The disposition for PRA Success Criteria associated with TS LCO 3.6.1.7 presented in the LAR, Enclosure 1, Table E1-1, states: "The PRA Model includes an event which involves a large, pre-existing containment leak; this would be bounding for the risk associated with an inoperable air lock door closed, and can be used as a bounding surrogate." The disposition for PRA functionality associated with TS LCO 3.6.4 (Containment Isolation Valves) and TS LCO 3.6.1.3 (Containment Air Locks) also refers to use of this leak event in the PRA as a surrogate. Explain why the leakage for a "large pre-existing containment leak" is a "bounding surrogate" for the leak events above.

APLA RAI 4 – TS LCO 3.6.2.1

In LAR, Table E1-1, in the rows "3.6.2.1 Containment Spray (CS) System" and "3.6.2.1 Emergency Containment Cooling System," the "Disposition" column states, "Failure of the Emergency Containment Cooling function does not directly impact either core damage or large early release mitigation, but is modeled for level two PRA." TSTF-505, Revision 1, June 14, 2011, states "[t]he 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 Risk Informed Completion Time cannot be quantitatively determined." Clarify why Required Actions associated with these systems can be modified with respect to the TSTF guidance, and explain how a RICT based on CDF and LERF can be quantitatively determined.

APLA RAI 5 – Applicability of Guidance

Table E9-1, "Disposition of Key Assumptions...," of the LAR includes a row starting with "GENERIC Impact of failure of RCS pressure relief." The "Discussion" column states, "[g]eneric success criteria based on CEOG guidance for pressure relief are used." Summarize the evaluation and results that lead to accepting the CEOG guidance as applicable to the 3-loop Westinghouse Turkey Point Units 3 and 4.

APLA RAI 6 – Minimum Joint HEPs

Guidance in NUREG-1792, "Good Practices for Implementing Human Reliability Analysis (HRA)," (Table 2-1) recommends joint human error probability (HEP) values should not be below 1E-05. Table 4-3 of EPRI 1021081, "Establishing Minimum Acceptable Values for Probabilities of Human Failure Events," provides a lower limiting value of 1E-06 for sequences with a very low level of dependence. F&O 4-24 from the FPRA peer review listed in LAR, Enclosure 2, Table 2, states, "…the reasonableness of risk-significant, post initiator HEPs relative to each other was not yet reviewed in the scenario context, plant history, procedures, operational practices, and experience." The peer review team noted that this F&O originated from SR HR-G6. Based on the disposition to this F&O, it appears that minimum joint HEPs were not applied in the internal events PRA and that no update was made to the PRA as a result of this F&O. The NRC staff notes that underestimation of minimum joint probabilities could result in nonconservative RICTs of varying degrees for different inoperable SSCs.

Furthermore, the staff has considered the license amendments adopting NFPA 805 (May 28, 2015, ADAMS Accession No. ML15061A237), which states regarding the clarification of the disposition of PRA RAI 29.c.i, "the licensee provided a sensitivity study applying a floor value of 1.0E-05 to all HEP combinations in the FPRA model," and "the licensee stated it applies a joint HEP floor value of 1.0E-05 in the updated PRA." The NRC concluded that the fire PRA values include an acceptable minimum joint HEP value, but these changes were not reviewed for internal events.

Given that it is not clear from the F&O disposition whether or to what extent a dependency analysis was performed as part of the HRA, and whether minimum joint probabilities were applied to combinations of HEPs appearing in the same cutset, provide the following:

A. Describe the HRA dependency analysis performed in response to this F&O used in the PRA and whether it is consistent with NRC accepted guidance. In the response, specifically address how each of

the issues identified by the peer review was dispositioned. If the approach to performing HRA dependency analysis is not consistent with NRC guidance, then justify this departure.

B. Also, confirm that each joint HEP value used in the internal events PRA below 1.0E-06 and each joint HEP used in the fire PRA below 1E-05 includes its own separate justification that demonstrates the inapplicability of the NUREG-1792 lower guideline values. Provide an estimate of the number of joint HEPs below the guideline values, discuss the range of values, and provide at least two different examples where justification has been developed.

C. If the assessment described in item b) has not been performed or if minimum joint probability "floor" was not applied or the value of the "floor" cannot be justified, then explain how underestimating joint human error probabilities impacts the RICT estimates.

APLA RAI 7 – Translation to Configuration Risk Management Program (CRMP) Model

Enclosure 8, Section 2.0, of the LAR describes the process that will be used to translate the baseline PRA models for use in the CRMP model to be used in the RICT Program. The description implies that the CRMP model has not yet been developed and, furthermore, the translation process itself does not appear to be fully developed. Specifically, some expected adjustments or changes to the baseline model are not identified, such as use of a plant availability factor for determining the average annual risk that would not be applicable to configuration-specific risk.

A. Summarize the translation process.

B. Provide a comprehensive discussion of the changes made to the baseline PRA model to produce the CRMP model and how it is assured that these changes are appropriate and comprehensive.

APLA RAI 8 - PRA Functionality

Model Application to TSTF-505, Revision 1, "Proposed Revision to the Model Application for TSTF-505, Revision 1, 'Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b'," Enclosure 1 (ADAMS Accession No. ML12032A065) states:

> This enclosure should provide a description of PRA functionality for each associated specified safety function that corresponds to each proposed Required Action that is applicable when all trains of equipment are inoperable as discussed in Section 2.3.1.10 of NEI 06-09.

The TSTF-505 enclosure guidance is included as part of the model application because the NRC staff seeks clarity in how PRA Functionality will be used during full power operation following "loss of a specified safety function or inoperability of all required trains or divisions of a system." Provide justification for PRA functionality for each associated specified safety function consistent with TSTF-505 as requested below:

A. To provide confidence that the defense-in-depth philosophy is maintained as the completion times (CTs) are extended, the NRC staff requests the following information for three of the defense-in-depth "circumstances" described in RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decision-making: Technical Specifications," Revision 1, May 2011.

I. *System redundancy, independence, and diversity are maintained commensurate with the expected frequency and consequences of challenges to the system (e.g., there are no risk outliers). The licensee should consider…whether there are appropriate restrictions in place to preclude simultaneous equipment outages that would erode the principles of redundancy and diversity.*

Beyond prohibiting voluntary entry, the guidance on PRA Functionality in NEI 06-09 does not address how PRA Functionality should be defined when the systems, structures, and components (SSCs) normally relied on to perform a specified safety function are unavailable. Specifically, the PRA often includes alternative SSCs that could be used to fulfill a specified safety function when

the SSCs referenced in the TSs are unavailable. Crediting alternative SSCs when the SSCs normally relied on are unavailable would represent a reduction in redundancy or diversity. Please confirm that SSCs credited in a PRA Functionality determination are the same SSCs relied upon to perform the specified safety function. If a PRA Functionality determination for a loss of a specified safety function or inoperability of all required trains or divisions of a system credits SSCs other than the SSCs covered by the TSs (e.g., crediting the Fire Protection system as an alternative water source), please summarize each such TS and justify how appropriate redundancy and diversity is maintained if alternative SSCs are credited.

II. *Over-reliance on programmatic activities as compensatory measures associated with the change in the licensing basis is avoided (e.g., the change does not use high reliability estimates that are primarily based on optimistic program assumptions).*

a. Please confirm that all human actions required to achieve PRA functionality upon loss of specified safety function are modeled in the PRA (i.e., they are all explicitly proceduralized; and that they all are (1) trained on or (2) not trained on because they are so simple as to be skill of the craft).

b. If any human actions were evaluated and credited in the PRA scenarios, but not modeled in the PRA,

i. Summarize the action and the evaluation.

ii. Clarify why not modelling each action will have a negligible impact on core damage frequency and large early release frequency and the associated CT that will be used when the corresponding PRA Function to TS LCO/Conditions is unavailable.

iii. If any other human actions are directly or indirectly credited in the CT length calculations, please provide the same information as in part A and B.

III. *The intent of the plant's design criteria is maintained.*

The intent of the design basis design criteria is that all design basis accident scenarios could be mitigated, i.e., the minimum specified safety function capability is available. To maintain this intent, PRA Functionality should not include any scenarios that allow any design basis accident initiator to proceed directly to core damage (e.g., Loss of Offsite Power/Loss of Coolant Accident).

Please confirm that PRA Functionality does not include any scenarios that allow any design basis accident to proceed directly to core damage or containment failure, or identify the scenarios and justify that the intent of the design criteria is maintained and describe how the PRA functionality determination will verify these requirements are met.

B. To provide confidence that sufficient safety margins are maintained, NRC Staff requests the following information for the detailed "circumstance" described in RG 1.177.

Safety analysis acceptance criteria in the final safety analysis report (FSAR) are met or proposed revisions provide sufficient margin to account for analysis and data uncertainties (e.g., the proposed TS CT or SF change does not adversely affect any assumptions or inputs to the safety analysis, or, if such inputs are affected, justification is provided to ensure sufficient safety margin will continue to exist). For TS CT changes, an assessment should be made of the effect on the FSAR acceptance criteria assuming the plant is in the condition addressed by the proposed CT (i.e., the subject equipment is inoperable) and there are no additional failures. Such an assessment should result in the identification of all situations in which entry into the condition addressed by the proposed CT could result in failure to meet an intended safety function.

Some TS safety functions are credited in design basis accident scenarios modelled in the PRA but are also required in other design basis accident scenarios not modelled in the PRA because the other scenarios do not contribute to CDF and LERF or are not needed within the PRA mission time.

I. Please confirm that the PRA Functionality modelled in the PRA is also available and sufficient for the remaining design basis accident scenarios that are not modelled in the PRA because the un-modelled design basis accident scenarios do not affect CDF or LERF (e.g., containment spray may be credited as decay heat removal in some plants which is modeled in the PRA. It may also provide an iodine removal function for the same plants, which is not modeled in the PRA) or describe how the PRA functionality determination will provide confidence the requirements credited in the un-modelled design basis accident scenarios are met.

II. Please confirm there are no safety functions required to reach a safe and stable state but are not included in the PRA because they are only required after the 24 hour mission time generally used in the PRA (e.g., some alternative primary water sources may lead to excessive boron dilution after some loss-of-coolant accidents but only after at least 24 hours, so boron is not modelled in the PRA) or describe how the PRA functionality determination will provide confidence the requirements credited in design basis accident scenarios are met.

III. In Table E1-1 of its application dated December 5, 2014, the licensee noted differences between the design basis success criteria and the PRA success criteria for certain specified safety functions. The licensee also noted that the risk-informed Configuration Risk Management Program (CRMP) will ensure that adequate margins of safety are maintained. The licensee also noted in the Administrative Controls section that conditions which represent a loss of function cannot be entered voluntarily. However, the response did not address how safety margin was maintained for the case of a PRA functionality determination for a loss of a specified safety function or inoperability of all required trains or divisions of a system. For this case, please elaborate on how adequate safety margins are maintained and provide some clarifying examples of adequate safety margins for where the PRA success criteria (e.g., flow rates, temperature limits) differ from the design criteria.

C. Extended completion times are limited to no more than 30 days, i.e., a 30-day “backstop.” During the Audit, FPL mentioned the possibility of administratively limiting the time in total loss of function LCOs (i.e., both/all trains inoperable) to 24 hours when using a PRA functional argument. Explain how FPL will incorporate this 24-hour limit into the technical specifications.

APLA RAI 9 – NFPA 805 Modification Implementation

The NRC Safety Evaluation (SE) for NEI 06-09 (ADAMS Accession No. ML071200238) approved and provided limitations and conditions for use of the TR. Section 4.0, Item 6, of the SE requires that the licensee provide the plant-specific total CDF and LERF to confirm that these are less than 1E-4/year and 1E-5/year, respectively. This is consistent with the risk acceptance guidelines in Regulatory Guide 1.174 (ADAMS Accession No. ML100910006).

In Table 5-1, Enclosure 5 of the application, the licensee provided baseline fire risks of 8.66E-05/year and 5.35E-06/year for CDF and LERF, respectively, for Unit 3, and 7.69E-05/year and 4.85E-06/year for CDF and LERF, respectively, for Unit 4.

The licensee also provided baseline fire risks in LAR Attachment W, Letter to U.S. Nuclear Regulatory Commission, "Turkey Point Nuclear Generating Station Units 3 and 4, Docket Nos. 50-250 and 50-251, Response to Request for Additional Information Regarding LAR No. 216, Transition to 10 CFR 50.48(c) - NFPA 805 Performance-Based Standard for Fire Protection," (ADAMS Accession No. ML14279A093). These post-NFPA-805-modification fire risk values are 8.86E-05/year and 5.45E-06/year for CDF and LERF, respectively, for Unit 3, and 8.10E-05/year and 4.98E-06/year for CDF and LERF, respectively, for Unit 4.

The reported fire risk values in the different documents are similar but not the same. If the licensee receives the RICT amendment approval before the NFPA-modifications are completed and wants to implement the RICT program before the modifications are completed, then:

A. Provide an estimate of the total CDF and LERF for the as-built, as-operated plant at the time the RICT program will be implemented to ensure that it satisfies the limitations and conditions in Section 4.0, Item 6, of the NEI 06-09 SE.

B. Confirm that modifications that are not yet installed are not credited in the CDF and LERF calculation for each RICT calculation.

An alternative option to providing the information in parts A and B would be for the licensee to propose a license condition that delays implementation of the RICT program until the NFPA modifications are complete.

APLA RAI 10 – Human Action Surrogate Events

The RICT program is equipment-oriented (e.g., SSCs may be out of service), but allows a proper surrogate to be used for the equipment not modelled in the PRA. In some instances Operator actions are used “as a surrogate to conservatively bound the risk increase associated with [certain] functions.” For example, Table E1-1 of the LAR, under 3.3.2 for “Function 1a – Safety Injection (SI) – Manual Initiation” states in the “Disposition” column that, “[t]he operator action for failure to actuate a manual SI will be used as a surrogate to conservatively bound the risk increase associated with this function.” For each such surrogate in your PRA models, explain how the action fully models each different failure mode, and partial failure modes, of the equipment being represented by the action.

APLA RAI 11 – Instrumentation Models

Instrumentation is often not modelled in detail in PRAs and in some cases is only modelled as a single, generic basic event generally representing all trains.

A. Clarify how individual instrument unavailability can be accounted for in the RICT calculations that use a single basic event (e.g., TS 3.3.5 B.1).

B. Alternatively describe how instrumentation is modelled in sufficient detail in the PRA to appropriately model the different effects of different numbers of trains (e.g., one, two, three and four) unavailable in order to estimate a RICT.

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