Moving Forward on Risk Informed Completion Times

NRC Public Meeting

October 22, 2015

Introduction

- Issues regarding PRA functionality were resolved to NRC satisfaction previously
- No deficiencies that would invalidate TSTF-505 or NEI 06-09 SEs have been identified
- Need to reach common understanding of approach to be used in TSTF-505 LARs

Key Points

- RICT process and use of PRA functionality is:
  - Well-understood by utilities
  - Reviewed in depth by NRC and ACRS
  - Implemented without issue
- Sufficient guidance regarding PRA functionality exists and will be included in plant/utility implementing procedures

RICT Background: Traditional TS vs. RICT

- Traditional TS are narrowly focused
  - Specific inoperable function
  - Redundant or diverse mitigating systems for design/licensing basis events
  - Do not typically account for the combination of all plant equipment and conditions or risks from multiple hazards
- NEI 06-09 methodology accounts for:
  - Current plant configuration reflecting all inoperable equipment
  - Risk from all hazards
- NEI 06-09 methodology is more holistic

RICT Background: Key Attributes

- A RICT window:
  - Is a temporary configuration (limited time)
  - Is implemented as part of online configuration risk management processes
  - Includes situation-specific compensatory measures
  - Uses risk assessed for a situation-specific configuration
  - Uses the "Zero Maintenance" version of the PRA model

Prior NRC Reviews of TS Initiative 4b

- Initiative 4b guidance was reviewed extensively by NRC
  - Extensive and multiple sets of RAI on process and implementation
  - Multi-day meetings with NRC and industry representatives to discuss process and requirements in 2005
  - Inter-disciplinary reviews and approvals by NRC engineering branches (including electrical and I&C), PRA branch, TS branch
  - Pilot experience feedback prior to final SER
- ACRS PRA subcommittee and full committee reviews and recommendation for approval in 2006
- Clear that existing guidance was sufficient for issuance of SE in 2007 and that intent of PRA functionality discussion was well-understood

Experience with Existing Guidance

- South Texas has implemented existing guidance on PRA functionality for nearly a decade
  - Deemed suitable by NRC
  - No findings from NRC inspectors throughout implementation
- Vogtle procedures reviewed by NRC on site with positive feedback
- Operators at Diablo Canyon and Vogtle have received training
  - Based on existing guidance in NEI 06-09 and NRC SE
  - No difficulties with implementing concept of PRA functionality

PRA Functionality

- From NEI 06-09: *Functionality that can be explicitly credited in a RICT calculation of a Technical Specification inoperable SSC*
- If the cause of inoperability is modeled in the PRA, remaining unaffected capability of SSC can be credited in the RICT calculation.

PRA Functionality

- PRA Functionality can be defined at the system, train or component level
- PRA Non-Functionality means a modeled SSC(s) is <u>not available</u> to perform its PRA function
- PRA Functionality means a modeled SSC(s) is <u>available</u> to perform its PRA function
- Configuration-specific CDF/LERF is a function of SSCs that are PRA Functional and PRA Non- Functional
- Traditional TS inoperability is not the same as PRA non-functionality

Addressing PRA Functionality in TSTF-505 LARs

- Enclosure 1 of TSTF-505 Model Application
  - Requires identification of TS functions and success criteria for each LCO and the corresponding PRA functions and success criteria
  - Disposition of any differences and any use of bounding assessments for TSTF-505 is provided by licensee and reviewable by NRC prior to issuing the amendment
- NEI 06-09, used only to:
  - Calculate realistic RICTs based on actual capability of inoperable SSCs
  - Ensure the TS function of the LCO still available in at least one redundant train considering actual capability of inoperable SSCs and PRA success criteria

Path Forward

- NEI 06-09 and TSTF-505, and their respective SERs, provide sufficient guidance to licensees and NRC reviewers
- No revisions to existing guidance necessary
  - Communication regarding program to regions, inspectors, and utility operations organizations would be more beneficial
- No deficiency has been identified in the supporting SEs
  - Should be implemented without exception

Backup Slides

PRA Functionality - Examples

- If the cause of inoperability is modeled in the PRA, remaining unaffected capability of SSC can be credited in the RICT calculation.
  - Example: Inoperable valve secured closed, closed functions credited, open functions not credited.
  - Example: One of two redundant flowpaths inoperable and isolated, remaining unaffected path credited

PRA Functionality in Practice

- PRA functionality must provide documented justification that are subject to NRC reviews, audits or questions by resident inspectors
- Plant procedure provides requirements for determining whether SSCs that are declared inoperable can be considered PRA functional in RICT calculations

PRA Functionality –Two Train System

- Loss of Function occurs when functional-level success criteria is NOT met
  - Occurs when BOTH trains are PRA Non-Functional (loss of 2 of 2)
  - A RICT is not allowed when BOTH trains are PRA Non-Functional
- RICT is allowed during the following situations when a SINGLE train is PRA Non-Functional:
  - TS Non-Loss of Function Conditions, and
  - TS Loss of Function Conditions for unplanned plant conditions

PRA Functionality and PRA Success Criteria

- PRA functionality governed by success criteria for each function modeled in the PRA
- Can be considered when components or systems are inoperable but would not “fail” applicable PRA success criteria found in the model
- PRA success criteria may differ from design basis success criteria because realistic estimates of system capability are used in place of the licensing or bounding criteria
- Example: A high pressure coolant injection (HPCI) pump with a design basis flow rate of 5,000 gpm whereas success in the PRA model might be some lesser flow, based on thermal hydraulic analysis and mission time that are not constrained by highly unlikely bounding design basis conditions.

Maintenance of Defense in Depth

- The use of potential compensatory actions and risk management action measures retain defense in depth
  - Reduce the duration of risk sensitive activities
  - Remove risk sensitive activities from the planned work scope
  - Reschedule work activities to avoid high risk-sensitive equipment outages or maintenance states that result in high risk plant configurations
  - Accelerate the restoration of out-of-service equipment
  - Determine and establish the safest plant configuration

RICT Entry Examples

TS Condition	TS LOF Case 1	RICT Entry Rules For TS LOF Case 1	TS LOF Case 2	RICT Entry Rules For TS LOF Case 2	PRA Train -Level SC
3.7.5 C	2 of 3 AFW Trains Inop	1 of 2 Inop AFW Train PRA Func	3 of 3 AFW Trains Inop	Not In scope	1 of 3 AFW Trains PRA Func
3.5.1.C	2 of 4 ACCUMULATORS Inop	**1 of 2 Inop** ACCUMULATORS PRA Func	3 of 4 ACCUMULATORS Inop	**2 of 3 Inop** ACCUMULATORS PRA Func	2 of 4 ACCUMULATORS PRA Func
3.7.7 B	2 of 2 CCW Trains Inop	1 of 2 CCW Train PRA Func			2 of 2 CCW Trains PRA Func