




McGuire/NRC Pre-submittal Meeting:
LAR to Adopt TSTF-505, Rev. 2 (Risk-Informed Completion Times)
LAR to Adopt 10 CFR 50.69

November 30, 2022

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Duke Energy Attendees

Ryan Treadway (Director, Nuclear Fleet Licensing)

Bob Rishel (Director, Probabilistic Risk Assessment)

Heather Szews (Manager, Probabilistic Risk Assessment)

Jordan Vaughan (Lead Nuclear Engineer, Nuclear Fleet Licensing)

Art Mironenko (Senior Nuclear Engineer, Probabilistic Risk Assessment)

Jennifer Varnedoe (Lead Nuclear Engineer, Probabilistic Risk Assessment)

Ryan Severns (Assistant Operations Manager – Shift, McGuire Operations)

John Banse (Shift Manager – McGuire Operations)

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Agenda

- TSTF-505
  - Introduction (Desired Meeting Outcomes)
  - PRA Models and Real-Time Risk Model Overview
  - License Amendment Request Overview
  - Recent OE (TSTF-505 LARs and associated audits)
  - Implementation
  - Timeline for LAR Submittal
- 10 CFR 50.69
  - License Amendment Request Overview
  - Timeline for LAR Submittal

Overview of PRA Portion of MNS TSTF-505 LAR

- Consistent with TSTF-505 Rev. 2 Template
  - No Loss of Function TS Actions are proposed
- PRA models updated/upgraded and peer-reviewed
- F&O Closure independently validated
- Total CDF/LERF meet RG 1.174 criteria
- Seismic: Penalty applied for CDF and LERF
- High Winds: LOOPs included in IE PRA
  - HW penalty applied for CDF and LERF for select LCOs above screening threshold
  - Submit LAR with option of using High Winds PRA in the future
- External Flooding: Hazard screened per the standard
- Unit-specific PRAs will be used for application
  - Sample calculations presented in LAR are from Unit 1, consistent with other applications

Internal Events PRA

- 2015 - MNS IE PRA model was subject to a full-scope peer review against RG 1.200 Rev. 2 IAW guidance in NEI 05-04.
- Findings were reviewed and closed in Feb 2016, May 2019 and Nov 2021 for the IE PRA model using the process documented in Appendix X to NEI 05-04, NEI 07-12 and NEI 12-13, “Close-out of Facts and Observations” (F&Os) as accepted by NRC (ML17079A427).
- There are zero open findings and all applicable supporting requirements are met at capability category II.

Internal Flood PRA

- 2011 - MNS IF PRA model was subject to a full-scope peer review against RG 1.200 Rev. 2 IAW guidance in NEI 05-04.
- Findings were reviewed and closed in Sep 2015, Dec 2018 and Sep 2022 for the IE PRA model using the process documented in Appendix X to NEI 05-04, NEI 07-12 and NEI 12-13, “Close-out of Facts and Observations” (F&Os) as accepted by NRC (ML17079A427).
- There are zero open findings and all applicable supporting requirements are met at capability category II.

High Winds PRA

- 2014 - MNS HW PRA model was subject to a full-scope peer review against RG 1.200 Rev. 2 IAW guidance in NEI 05-04.
- Findings were reviewed and closed in November 2021 for the HW PRA model using the process documented in Appendix X to NEI 05-04, NEI 07-12 and NEI 12-13, “Close-out of Facts and Observations” (F&Os) as accepted by NRC (ML17079A427).
- There are zero open findings and all applicable supporting requirements are met at capability category II.

Fire PRA

- 2009 - MNS Fire PRA was subject to full-scope peer review against RG 1.200 Rev. 2 IAW guidance in NEI 07-12.
- Focused scope industry peer reviews were conducted against RG 1.200 Rev. 2 related to an identified upgrades in Aug 2018, Nov 2020, Nov 2021, and Aug 2022.
- Findings were reviewed and closed in Aug 2018, Nov 2020, Nov 2021 and August 2022 for the Fire PRA models using the process documented in Appendix X to NEI 05-04, NEI 07-12 and NEI 12-13, “Close-out of Facts and Observations” (F&Os) as accepted by NRC (ML17079A427).
- There are zero open findings and all applicable supporting requirements are met at capability category II.

F&O Closure Review

- Formal process by independent review team
  - Assessed disposition of Findings for Internal Events, Internal Flooding, High Winds and Fire PRAs
  - Addressed in detail in the LAR assessment Technical Adequacy section
  - The process evaluated whether the disposition of each finding constitutes an update or upgrade

Other Hazards

Seismic

- The baseline and delta Seismic CDF (SCDF) is based on the Plant Level Fragility (PLF).
- The baseline Seismic LERF (SLERF) is based on the realistic LERF fragility while the delta SLERF is based on the conservatively biased Review Level Earthquake (RLE).
- Improved seismic penalty will be applied to all RICTs by eliminating two unrealistic conservatisms:
  - There is no configuration risk for seismic hazard bins with the Plant Level Fragility (PLF) or Conditional Core Damage Probability (CCDP) of 1.
  - The possible maximum configuration or delta risk for hazard bins with the PLF or CCDP close to one is limited by 1 – CCDP.

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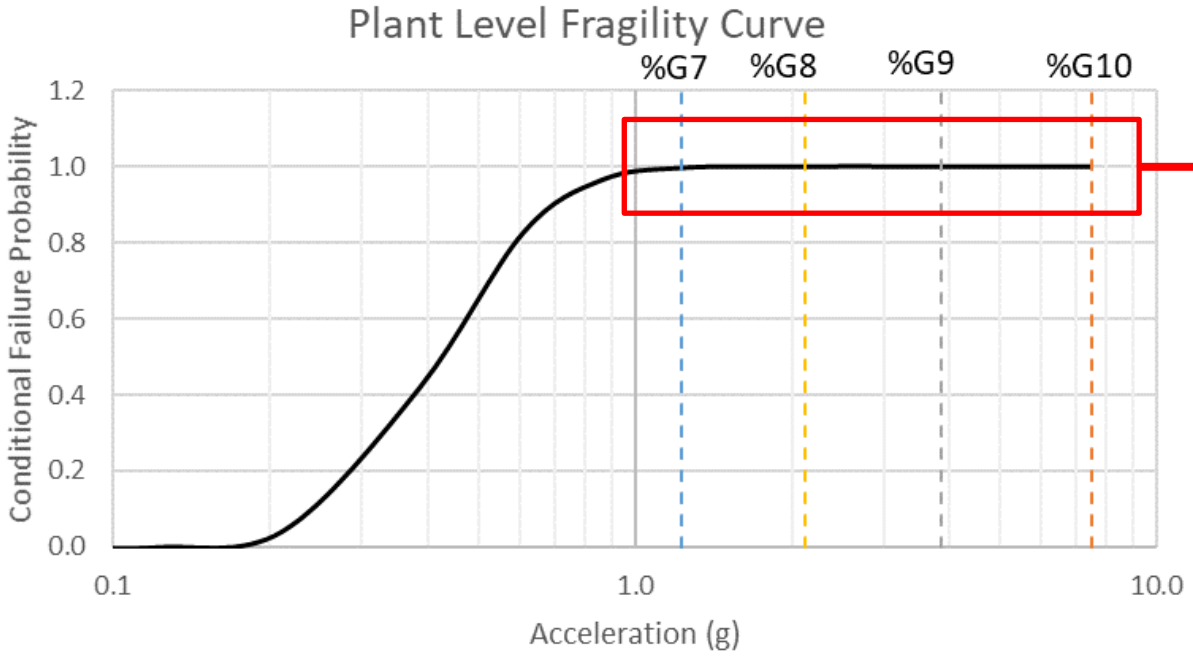
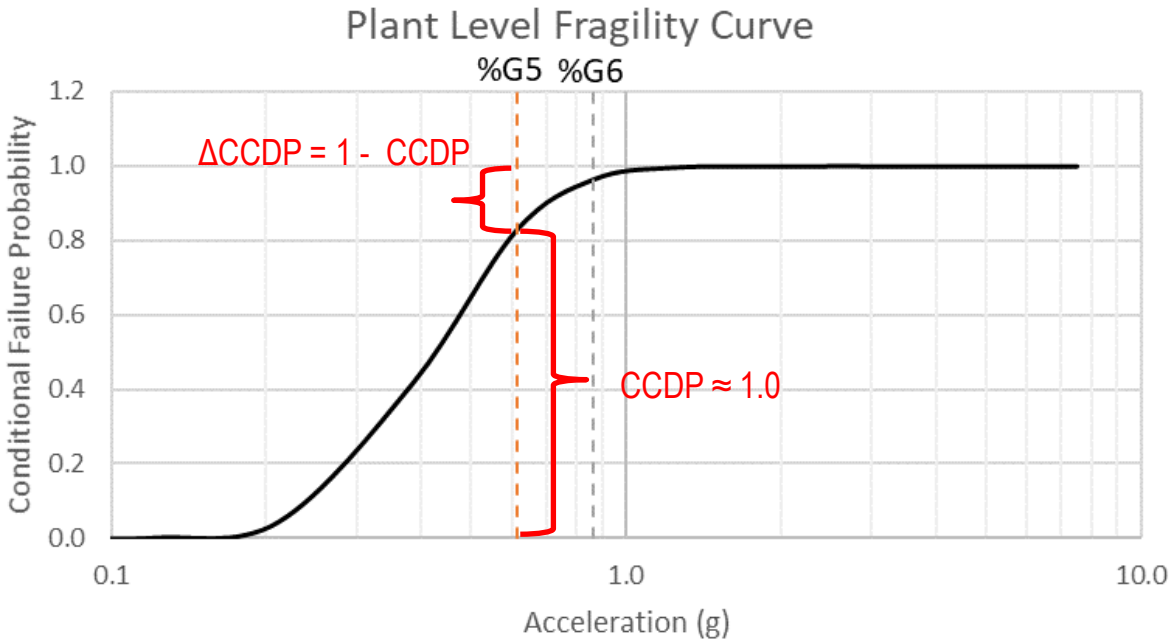


CCDP is one for %G7 to %G10. As such, there is no ΔCCDP for the sake of RICT calculation.



CCDP is already high, close to one. As such, the possible maximum ΔCCDP should be limited to 1 – CCDP for the sake of RICT calculation.

Other Hazards

High Winds

- High Winds LOOPs included in IE PRA
- High Winds penalty will be applied to select LCOs where configuration specific RICTs were above the screening threshold
- Hurricane, Straight-line winds and Tornado high wind hazard screened for other RICTs below the screening threshold
- Submit with option to use the High Winds PRA for RICT program in future, instead of penalty

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Other Hazards (continued)

External Flooding

- External Flooding hazard can be screened from calculations in the RICT Program.

Other Hazards

- No other external hazards required to be included in the RICT calculations.

RICT Program Real-Time Risk Model

- Real-Time Risk Model as currently used for existing Maintenance Rule a(4) Configuration Risk Management Program
  - Uses PHOENIX Risk Analysis Software
  - Incorporates RICT/RMAT calculation features

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License Amendment Request

- Based on TSTF-505, Revision 2 and NEI 06-09
- 19 different Technical Specifications (TS) impacted by proposed change
  - Various instrumentation TS are proposed to be in scope of RICT Program
- Modes 1 and 2 only for RICT Program
- New TS Section 5 Program for RICT Program
- Variations from TSTF-505, Revision 2
  - Subtle differences in Condition/Required Action wording
  - TSTF-505 Conditions/LCOs exist that are not in the MNS TS
  - Re-typed/clean TS pages not included
  - RICTs proposed for some plant-specific TS Actions not in TSTF-505, Rev. 2

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TS 3.3.1, Reactor Trip System (RTS) Instrumentation

TS 3.3.1 – Reactor Trip System (RTS) Instrumentation

LCO: The RTS instrumentation for each Function in Table 3.3.1-1 shall be Operable.

Table 3.3.1-1, Function 10.a: Reactor Coolant Flow-Low (Single Loop)

Condition O (re-numbered): One Reactor Coolant Flow – Low (Single Loop) channel inoperable.

- Function 10.a and associated Condition O (re-numbered) is plant-specific and thus is not in NUREG-1431/TSTF-505, Rev. 2
- Condition O (re-numbered) applies to one Reactor Coolant Flow – Low (Single Loop) inoperable.
  - 72 hours allowed to place the inoperable channel in trip
  - Conservatively models one generic 2/3 logic input (per train) which feeds into SSPS

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TS 3.3.2, ESFAS Instrumentation

TS 3.3.2 – Engineered Safety Feature Actuation System (ESFAS) Instrumentation

LCO: The ESFAS instrumentation for each Function in Table 3.3.2-1 shall be OPERABLE.

Table 3.3.2-1, Function 5.b.(4): Feedwater Isolation – T_{avg}-Low Coincident with Reactor Trip (P-4)

Condition J: One channel inoperable.

- NUREG-1431, and therefore TSTF-505, Revision 2, does not contain an ESFAS instrumentation function for Feedwater Isolation - T_{avg}-Low Coincident with Reactor Trip
- Condition J applies to one channel of the T_{avg}-Low feedwater isolation function inoperable
  - 72 hours allowed to place the inoperable channel in trip
  - Function is not explicitly modeled in the PRA; a surrogate is used for failure of Auxiliary Feedwater

TS 3.4.11, Pressurizer PORVs

TS 3.4.11 – Pressurizer Power Operated Relief Valves (PORVs)

LCO: Each PORV and associated block valve shall be OPERABLE.

Condition J: One Train B PORV inoperable and not capable of being manually cycled AND The other Train B block valve inoperable.

- Overview of system design
  - Train A: one PORV and an associated block valve
  - Train B: two PORVs, each with an associated block valve
- Condition J, which applies to one Train B PORV and the other Train B block valve (i.e., block valve associated with the Train B PORV remaining operable) inoperable, is a plant-specific Condition not in the NUREG-1431 STS or TSTF-505, Rev. 2
  - 72 hours allowed to restore either the PORV or block valve to operable status
  - No loss of function with Train A operable
  - SSCs explicitly modeled in the PRA

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TS 3.8.1, AC Sources - Operating

- The LCO for TS 3.8.1 contains a part "c." that states:
  - "The qualified circuit(s) between the offsite transmission network and the opposite unit's Onsite Essential Auxiliary Power System necessary to supply power to the Nuclear Service Water System (NSWS), Control Room Area Ventilation System (CRAVS), Control Room Area Chilled Water System (CRACWS) and Auxiliary Building Filtered Ventilation Exhaust System (ABFVES)"
- Condition C ("One LCO 3.8.1.c offsite circuit inoperable.") and Condition E ("Two LCO 3.8.1.a offsite circuits inoperable. OR One LCO 3.8.1.a offsite circuit that provides power to the NSWS, CRAVS, CRACWS and ABFVES inoperable and one LCO 3.8.1.c offsite circuit inoperable. OR Two LCO 3.8.1.c offsite circuits inoperable.") are plant-specific and account for the fact that McGuire is a dual unit plant and that the opposite unit AC sources have the capability to supply shared systems.
- Like the LCO 3.8.1.a offsite circuits (i.e., the unit-specific offsite circuits), the LCO 3.8.1.c offsite circuits are explicitly modeled in the PRA.

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Recent OE

- Key issues from other TSTF-505 audits:
  - Potential loss of function Conditions – none for McGuire
  - Defense-in-depth principles associated with instrumentation TS
  - Treatment/Credit for FLEX in the PRA Models
- OE from Harris/Brunswick TSTF-505 LAR/RAI Responses and other industry TSTF-505 LAR OE

Implementation

- Operations owns implementation
- Cross-functional team supporting implementation
- RICT implemented in Modes 1 and 2 only
- Real-Time Risk and PRA Models updated to support the RICT Program
- Procedure changes and training
- Industry OE (Benchmark, Risk-Informed TS Task Force, TSTF)

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Procedures and Training

- Existing fleet RICT Program procedures and revised site-specific procedures will address the following:
  - The new McGuire RICT Program (responsibilities, definitions, plant conditions for which the program applies etc.)
  - Calculation of risk management action times (RMAs) and RICTs
  - Development and implementation of RMAs
  - Use of the CRMP software tool (i.e., PHOENIX or the real-time risk model) with the RICT Program
- Three levels of training for the RICT Program is proposed:
  - Level 1 – User Training
  - Level 2 – Management Training
  - Level 3 – Site Awareness Training

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Timeline for LAR Submittal

- Next Steps:
  - Target submittal of LAR by end of January 2023
  - Revise site-specific implementing procedures in parallel and subsequent to NRC staff review of LAR; leverage existing fleet procedures that were developed and being utilized for the Harris and Brunswick RICT Programs
  - Conduct training for RICT Program
  - Ready to implement RICT Program within 180 days of receipt of SE

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10 CFR 50.69

- License Amendment Request Overview
  - Internal Events (including Internal Flood) and Fire
    - Same models as TSTF-505
  - External Hazards
    - HW screened using existing PRA
    - Seismic EPRI Tier 2
  - Alternate Passive Method

- Timeline for LAR submittal
  - Close to TSTF-505 submittal so that reviewer synergies can be applied


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