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United States Nuclear Regulatory Commission

Protecting People and the Environment

SRM-SECY-22-0076 Implementation: Branch Technical Position 7-19, Draft Revision 9

Public Meeting
November 14, 2023

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Meeting Purpose

This is an information meeting to provide external stakeholders an opportunity to ask the NRC staff questions about the draft revision to BTP 7-19.

- The NRC staff will not be collecting comments on the draft BTP as part of this meeting.
- To provide comments on the draft BTP revision:
  - Go to https://www.regulations.gov
  - Search for Docket ID NRC-2023-0181
  - Follow instructions for providing comments

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Opening Remarks

Presentation Outline

- SRM-SECY-22-0076 Direction and Staff Proposed Response
- Substantive Changes to BTP 7-19
- Next Steps
- Question and Answer Session
- Closing Remarks

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SRM-SECY-22-0076

- The Commission approved the staff's recommendation to expand the existing policy for digital I&C CCFs to allow the use of risk-informed approaches to demonstrate the appropriate level of defense-in-depth, subject to the edits provided
- The Commission directed the staff to clarify, in the implementing guidance, that the new policy is independent of the licensing pathway selected by the reactor licensees and applicants
- The Commission directed the staff to complete the final implementing guidance within a year from the date of the SRM (May 24, 2024)

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Substantive Changes to BTP 7-19

- Revised Section B.1.1 to reflect the updated four points in SRM-SECY-22-0076
- Revised Section B.1.2 for clarification of critical safety functions
- Revised Section B.3.1.3 for evaluation of alternative approaches
- Added Section B.3.4 for evaluation of risk-informed D3 assessment
- Revised Section B.4 for evaluation of different approaches for meeting Point 4
- Added four flowcharts to facilitate the review

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Staff Proposed Response to Meet the SRM

Staff drafted Revision 9 to SRP BTP 7-19

- Allows the staff to review risk-informed applications
- May result in use of design techniques other than diversity
- Focused the revisions on implementing the expanded policy

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Updated Four Points of the Policy (Section B.1.1)

- Replaced the four SRM-SECY-93-087 points with the SRM-SECY-22-0076 points
- Updated the explanation of the four points to reflect the language in the SRM-SECY-22-0076 points
- Identified the applicable BTP sections for the evaluation of an application against these four points

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Critical Safety Functions (Section B.1.2)

- Clarified that critical safety functions are those most important safety functions to be accomplished or maintained to prevent a direct and immediate threat to the health and safety of the public
- Clarified that the critical safety functions identified in SECY-93-087 are examples representative of operating light water reactors
- Clarified that other types of reactors may have different critical safety functions based on the reactor design safety analysis
  - The identification of such functions may be risk-informed

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Alternatives to Diversity (Section B.3.1.3)

Two Pathways

- Previous endorsement (e.g., RG) or approval (e.g., precedent or Topical Report)
  - Ensure it is applicable
  - Ensure it is followed
  - Justify any deviations
- A new approach proposed as part of an application
  - Use the acceptance criteria in BTP 7-19
  - Review description of vulnerability being addressed
  - Review description of alternative approach and justification

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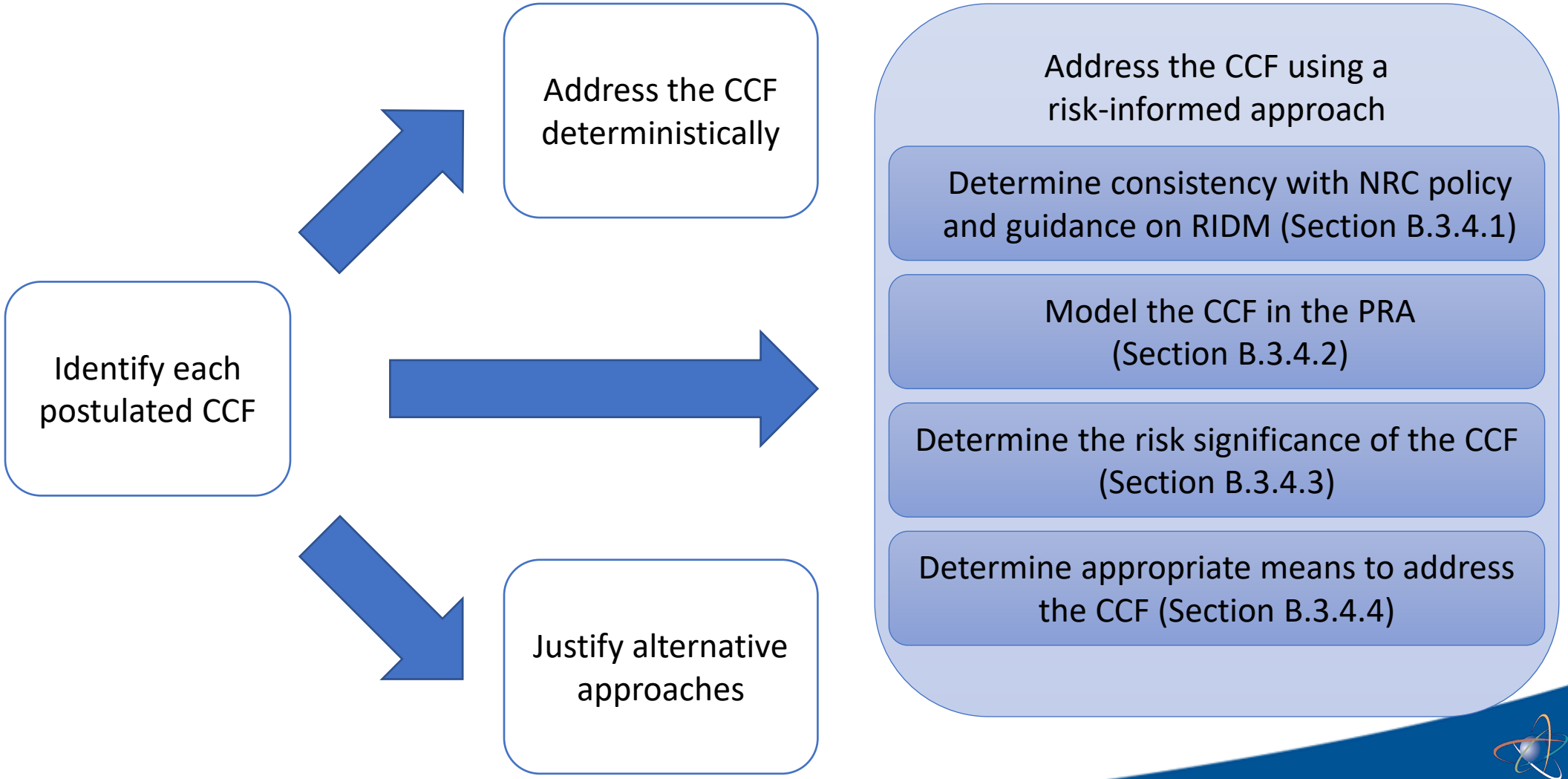
Risk-Informed D3 Assessment Process



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Risk-Informed D3 Assessment (Section B.3.4.1)

Determine Consistency with NRC Policy and Guidance on RIDM

- Review applications that use risk-informed approaches for consistency with established NRC policy and guidance on RIDM
  - RG 1.174
  - RG 1.200
- Current staff review guidance includes:
  - SRP Chapter 19
  - DC/COL-ISG-028
- SRP Chapter 19 provides review guidance for addressing the principles of risk-informed decision-making, including defense in depth

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Risk-Informed D3 Assessment (Section B.3.4.2)

Model the CCF in the PRA

- Determine if the base PRA meets PRA acceptability guidance identified in the application
- Evaluate how the CCF is modeled in the PRA and the justification that the modeling adequately captures the impact of the CCF on the plant
- Options for modeling the CCF in the PRA include:
  - Detailed modeling of the DI&C system
  - Use of surrogate events
- Follow identified PRA acceptability guidance to determine if CCF modeling is a PRA upgrade or maintenance

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Risk-Informed D3 Assessment (Section B.3.4.3)

Determine the Risk Significance of the CCF

- The risk significance of a CCF can be determined using a bounding sensitivity analysis or a “conservative” sensitivity analysis
- A bounding sensitivity analysis:
  - Assumes the CCF occurs
  - Provides a description of the baseline risk
- A “conservative” sensitivity analysis:
  - Provides a technical basis for a conservative probability (less than 1) of the CCF, demonstrating that all principles of RIDM, especially defense in depth and safety margins, are addressed
  - Addresses the impact of this assumption on PRA uncertainty

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Risk-Informed D3 Assessment (Section B.3.4.3)

Determine the Risk Significance of the CCF

- The quantification accounts for any dependencies introduced by the CCF, including the ability for operators to perform manual actions
- A CCF is not risk significant if the following criteria are met for the sensitivity analysis:
  - The increase in CDF is less than 1×10^{-6} per year
  - The increase in LERF is less than 1×10^{-7} per year

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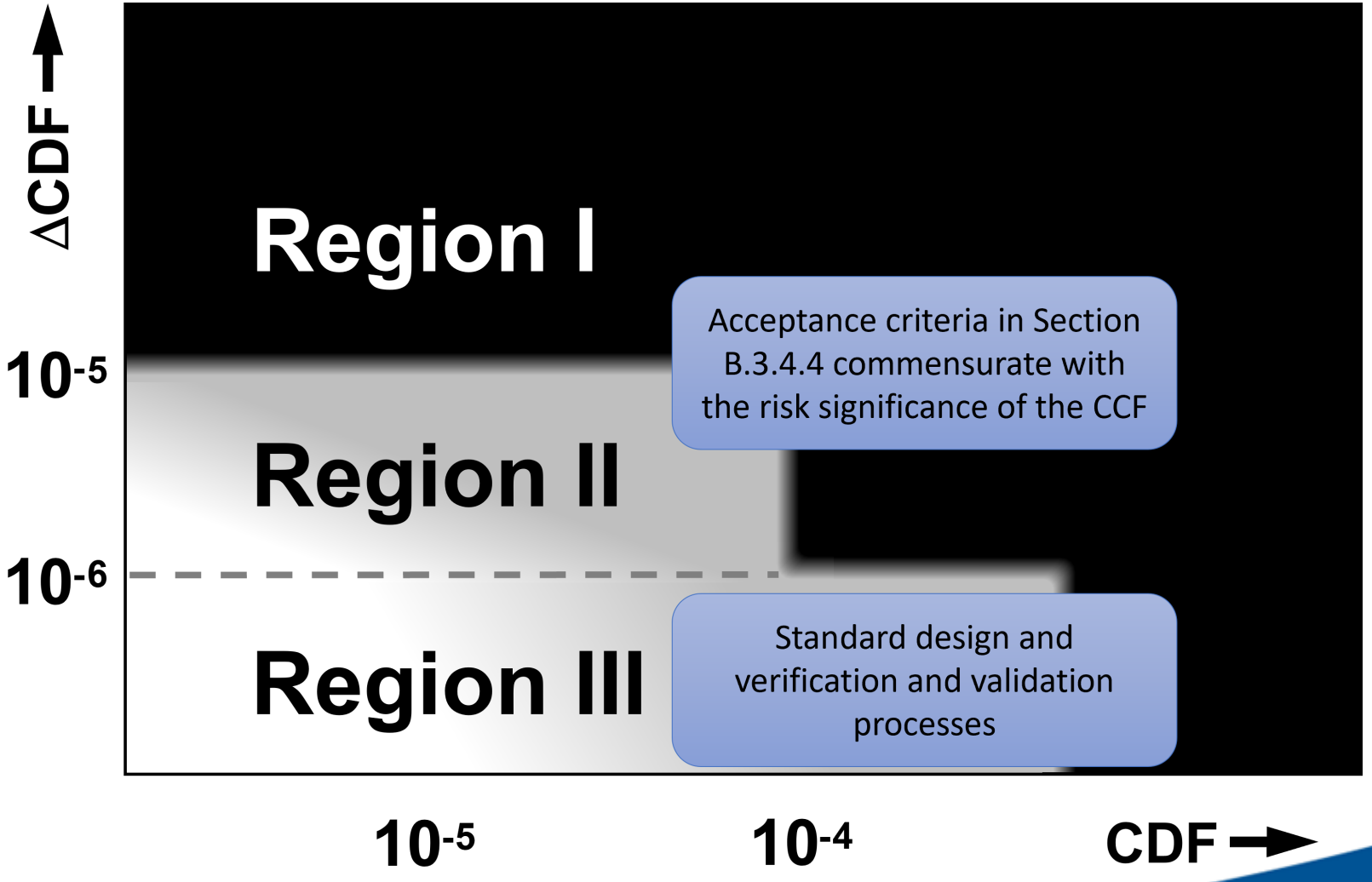
Risk-Informed D3 Assessment (Section B.3.4.4)



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Risk-Informed D3 Assessment (Section B.3.4.4)

- If a CCF is not risk significant, standard design and verification and validation processes are sufficient to address the CCF
- If a CCF is risk significant, the following apply, with a level of technical justification commensurate with the risk significance of the CCF:
  - The application identifies the CCF vulnerabilities or causes
  - The application provides a description of how it addresses the CCF vulnerabilities or causes (including any conditions or limitations)
  - The application provides a technical basis explaining how it addresses the identified CCF vulnerabilities or causes and prevents or mitigates their effects

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Approaches for Meeting Point 4 (Section B.4)

- Section B.4 provides six acceptance criteria for independent and diverse main control room displays and controls for manual actuation of critical safety functions
- Applications that propose a different approach (i.e., one that does not meet all the acceptance criteria in B.4) provide appropriate justification

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Flowcharts to Facilitate the Use of the BTP

- Added four flowcharts at the end of the BTP:
  - Figure 7-19-1. Point 1 – Need for a Detailed D3 Assessment
  - Figure 7-19-2. Point 2 – Detailed Assessment
  - Figure 7-19-3. Point 3 – Addressing, Mitigating or Accepting the Consequences of Each CCF
  - Figure 7-19-4. Point 4 – Independent and Diverse Displays and Manual Controls
- The flowcharts provide a visual aid to the reviewers when reviewing an application against the four points
  - Identify the conceptual steps for performing the review
  - Identify the applicable BTP sections

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Next Steps

- The public comment period ends on November 24, 2023
- The staff is planning to issue the final BTP 7-19, Rev. 9 in May 2024

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Question and Answer Session

Closing Remarks

Acronyms

ACRS	Advisory Committee on Reactor Safeguards
BTP	Branch Technical Position
CCF	Common Cause Failure
CDF	Core Damage Frequency
D3	Defense-in-Depth and Diversity
DAS	Diverse Actuation System
DI&C	Digital Instrumentation and Control
DRG	Design Review Guide
ESFAS	Engineered Safety Features Actuation System
GDC	General Design Criteria
I&C	Instrumentation and Control
ISG	Interim Staff Guidance
LERF	Large Early Release Frequency
LMP	Licensing Modernization Project
LWR	Light-Water Reactor
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PRA	Probabilistic Risk Assessment
RG	Regulatory Guide
RIDM	Risk-Informed Decision-Making
RPS	Reactor Protection System
SECY	Commission Paper
SRM	Staff Requirements Memorandum
SRP	Standard Review Plan