RG 1.205, Rev. 1
SRP Chapter 9.5.1.2

RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION FOR EXISTING LIGHT-WATER NUCLEAR POWER PLANTS

NEI Fire Protection Information Forum, Plenary 7

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Presentation Topics

- Where are we? (schedule)
- Why are we revising RG 1.205?
- How does Rev. 1 affect transition?
- What about fire PRA quality?
- Can a licensee self-approve any FPP changes before full implementation of NFPA 805?

- Are there any questions?

Where are we? (schedule)

- Out for public comment
  - SRP: February 5, 2009
  - RG: March 25, 2009

Comment Periods Closed:

- SRP & RG: May 22, 2009

- ACRS Subcommittee in June, August, November 2009
- CRGR review in July, 2009
- ACRS Full Committee scheduled for December, 2009
- Estimate final SRP and RG by February, 2010

- Today's presentation will only talk about the Reg. Guide
  - SRP 9.5.1.2 will match the Regulatory Positions in RG 1.205

Why are we revising RG 1.205?

- DG-1218 was developed to incorporate lessons learned from the NFPA 805 pilot plant process, including:
  - NEI 04-02, Revision 2
  - FAQs that closed after the revision to NEI 04-02
  - Ongoing pilot plant meetings
  - Pilot plant license amendment request review, including regulatory audits at both Oconee and Harris
- Most of the changes were needed to:
  - Clarify guidance; e.g., plant change versus fire risk evaluations
  - Add missing guidance; e.g., additional risk of certain recovery actions

How does Rev. 1 affect transition?

- One concern we have heard from industry during public meetings involves "carry over" of a plant's existing fire protection licensing basis into an FPP using NFPA 805
- The Regulatory Positions in RG 1.205 are intended to lead to full and scrutable compliance with the new regulation
- Many features of a plant's existing FPP do "carry over" – but it is important to be clear as to how

NFPA 805 Compliance (Ch 3)

Chapter 3: Fundamental Fire Protection Program and Design Elements

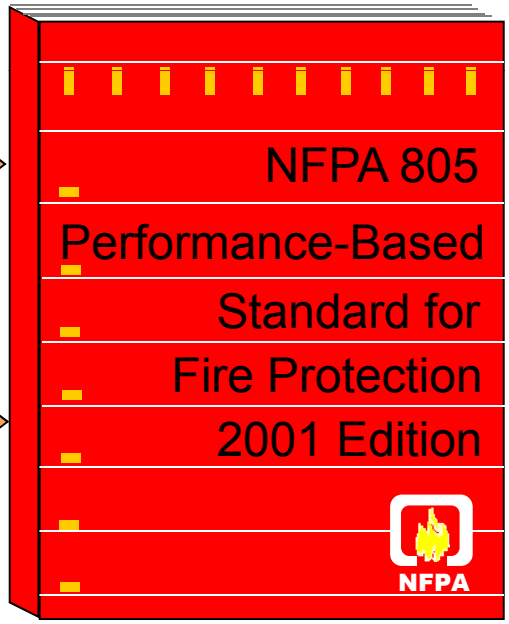
Chapter 4: Determination of Fire Protection Systems and Features

Comply as-written

NFPA 805 § 3.1

Previous approval (e.g., valid exemptions)

NFPA 805 § 3.1



NFPA 805 § 4.2.3

Deterministic compliance

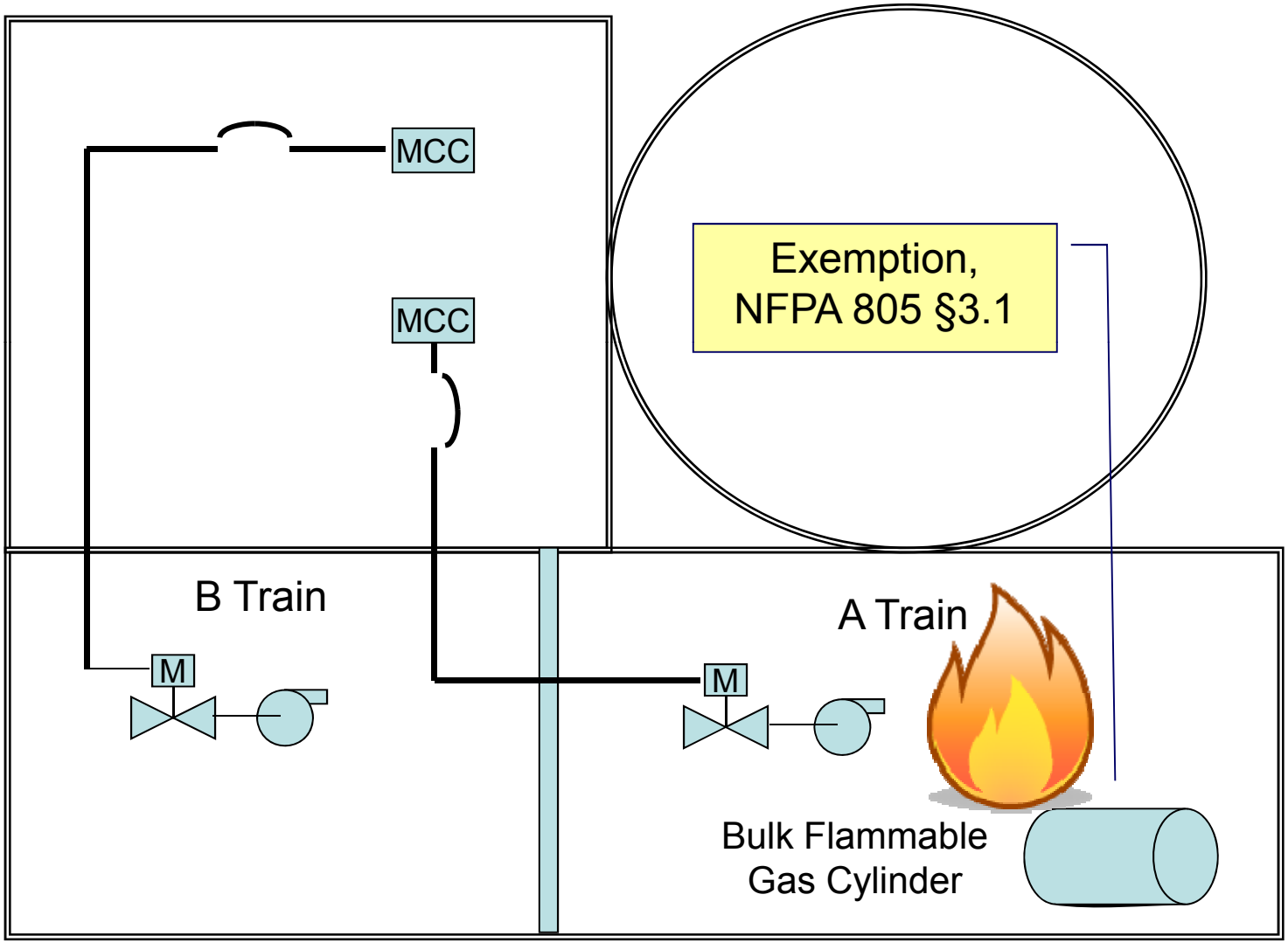
NFPA 805 § 2.2.7

Engineering Equivalencies

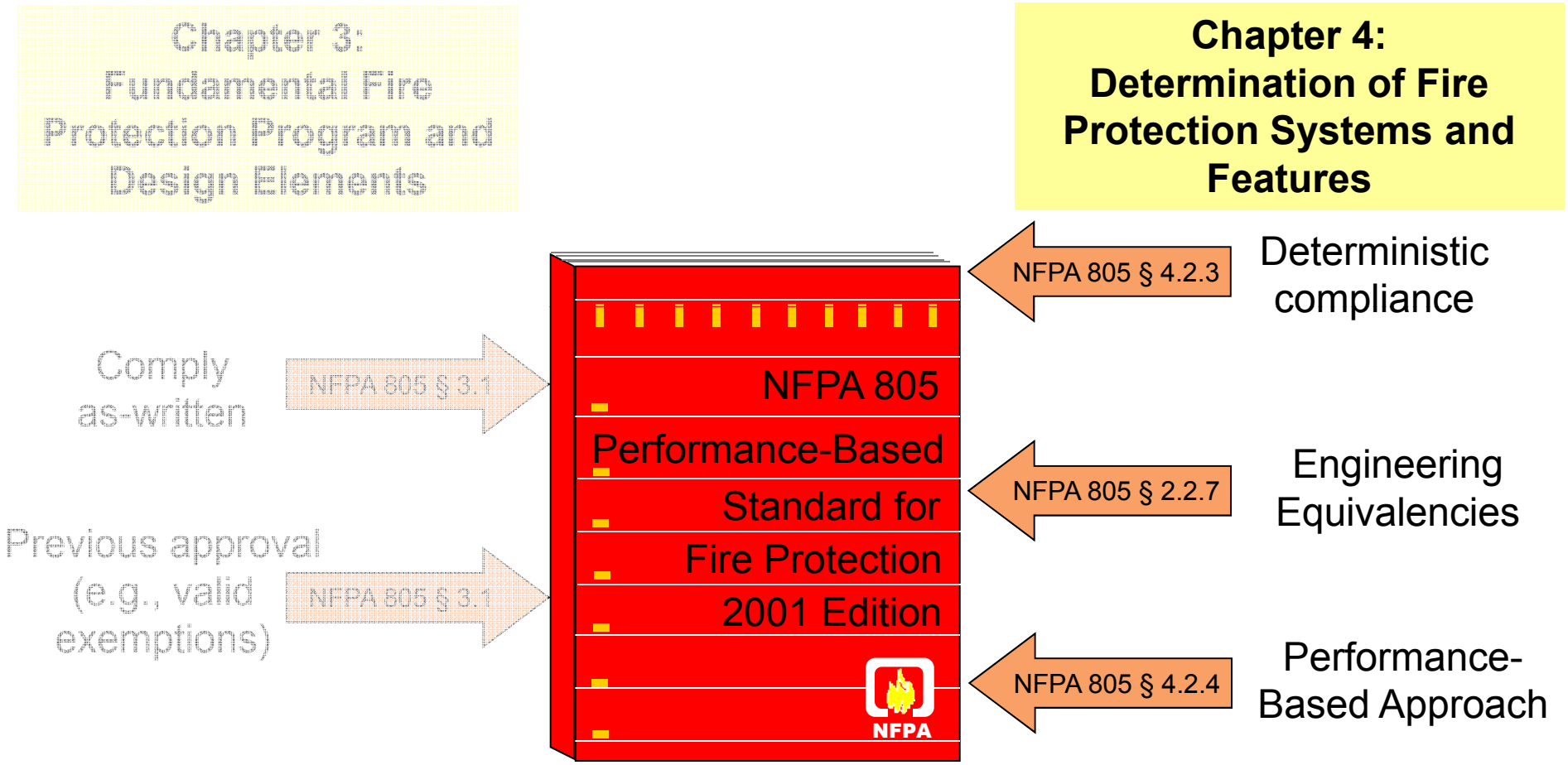
NFPA 805 § 4.2.4

Performance-Based Approach

Chapter 3 Compliance Example



NFPA 805 Compliance (Ch 4)



Existing Licensing Basis

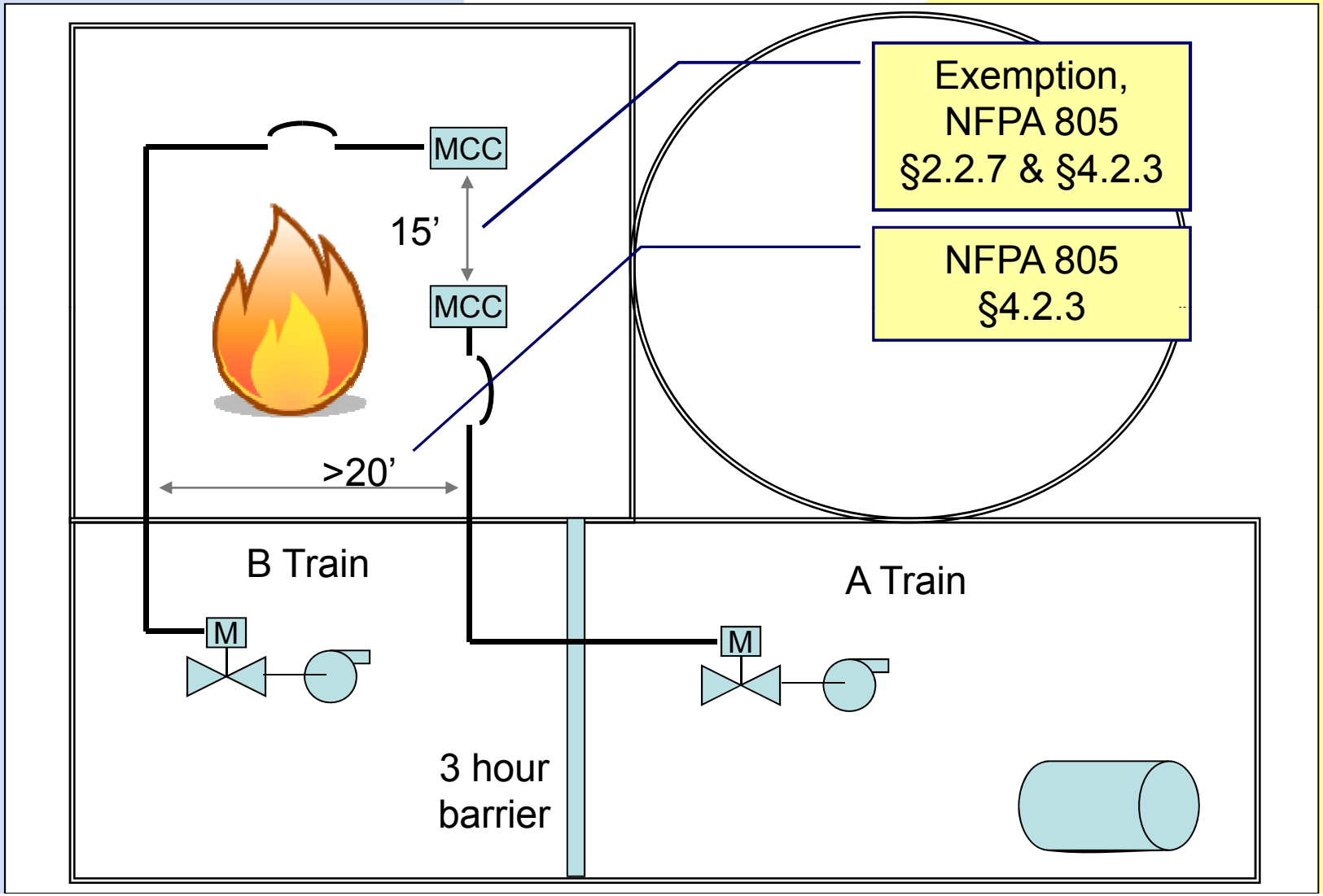
App R III.G.2
Separation, barriers, detection, suppression

TRANSITION

- Meets NFPA 805 § 4.2.3
- Equivalency per NFPA 805 § 2.2.7

NFPA 805 Licensing Basis

Meets §4.2.3 deterministic criteria



Existing Licensing Basis

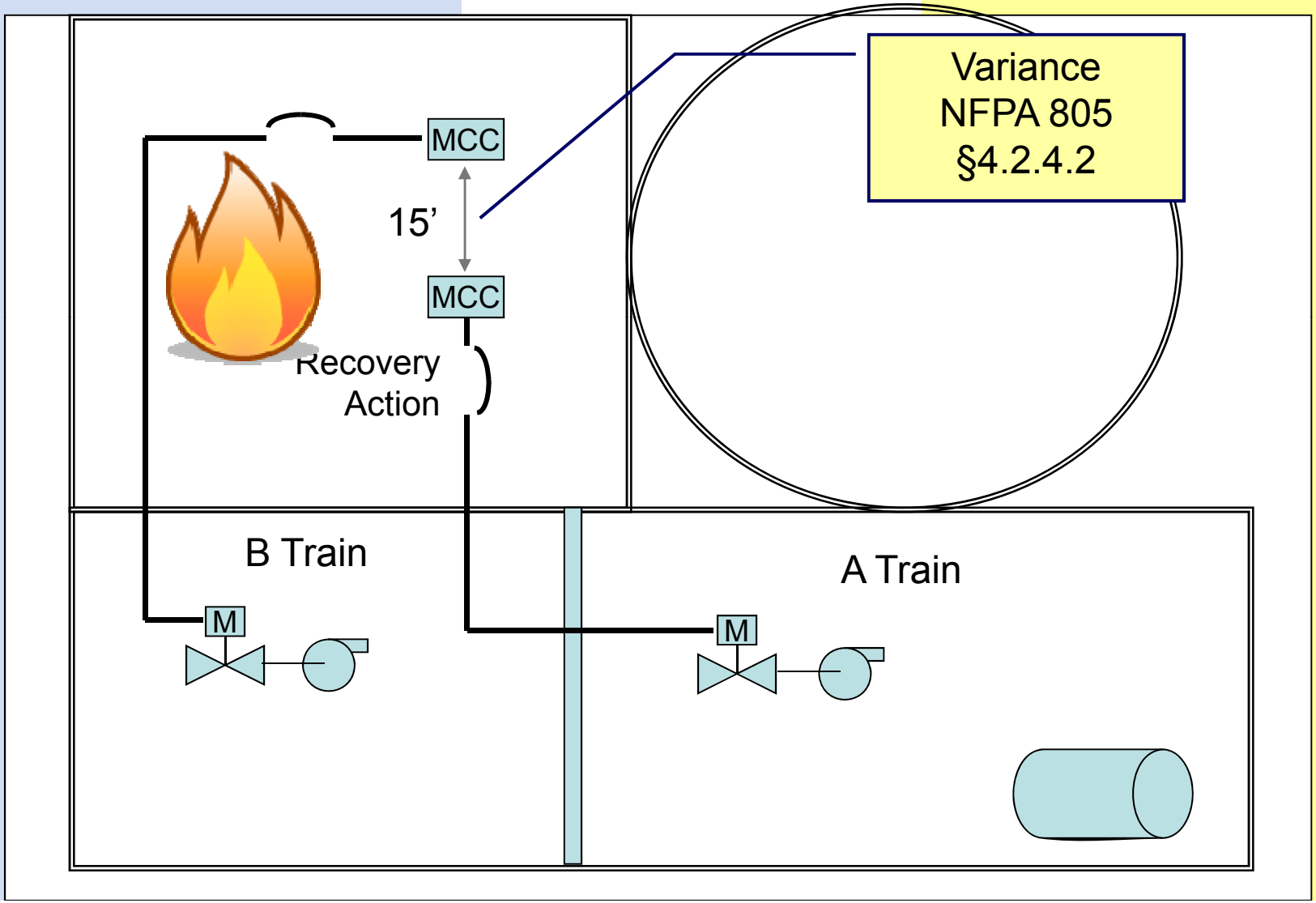
Variances – Non-approved Cables and Equipment

TRANSITION

- Fire modeling or Other Engineering Evaluation
- Fire Risk Evaluation

NFPA 805 Licensing Basis

Meet NFPA 805 §4.2.4.1
or
Meet NFPA 805 §4.2.4.2



Recovery Actions

- Recovery action:
  - "Activities to achieve [NSPC*] …that take place outside of the main control room or outside of the primary control station(s) for the equipment being operated … " (NFPA 805 §1.6.52)
- RG 1.205 defines "primary control station"
  - The definition recognizes that NRC-approved Appendix R III.G.3 approaches should "carry over" to NFPA 805 if certain criteria are met (next slide)

* Nuclear safety performance criteria

Existing Licensing Basis

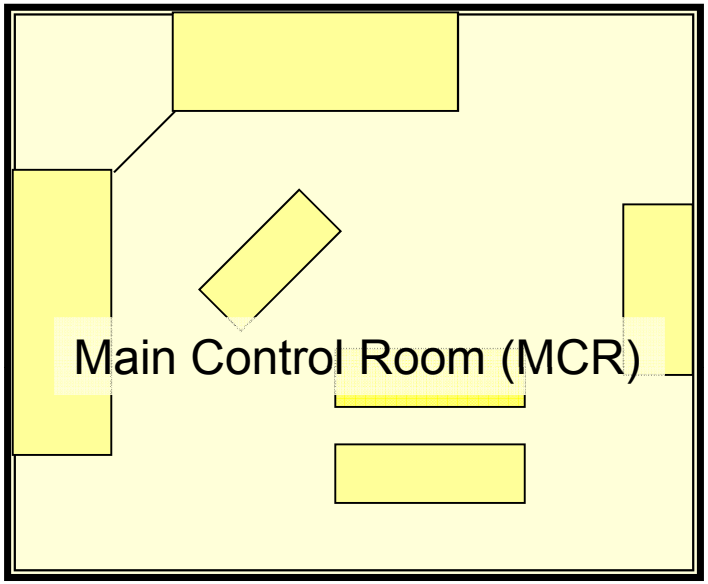
App R III.G.3 Actions
"Dedicated" shutdown
"Alternative" shutdown

TRANSITION

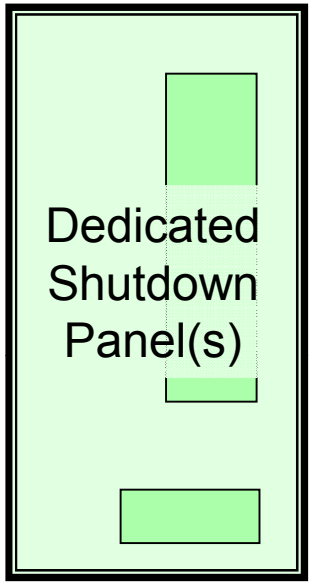
- Verify previous approval
- Verify "alternative" meets RG 1.205

NFPA 805 Licensing Basis

Meets §4.2.3 deterministic criteria (not recovery actions)

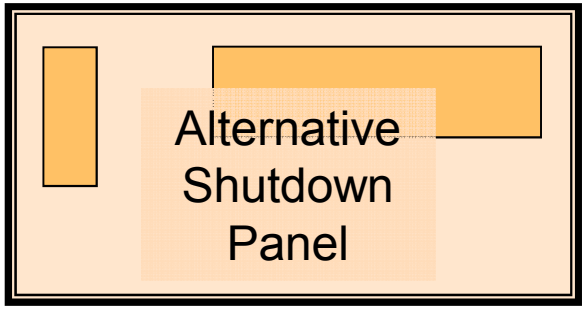


Actions in Control Room & at Dedicated Shutdown* Panels – NOT recoveries when primary control shifted from MCR



Actions at Alternative Shutdown* panel are not recoveries if:

- Primary command & control
- Requisite controls, indications, & communications
- Multiple components controlled from location



* As defined in Appendix R III.G.3 and approved by NRC

Recovery Actions (cont'd)

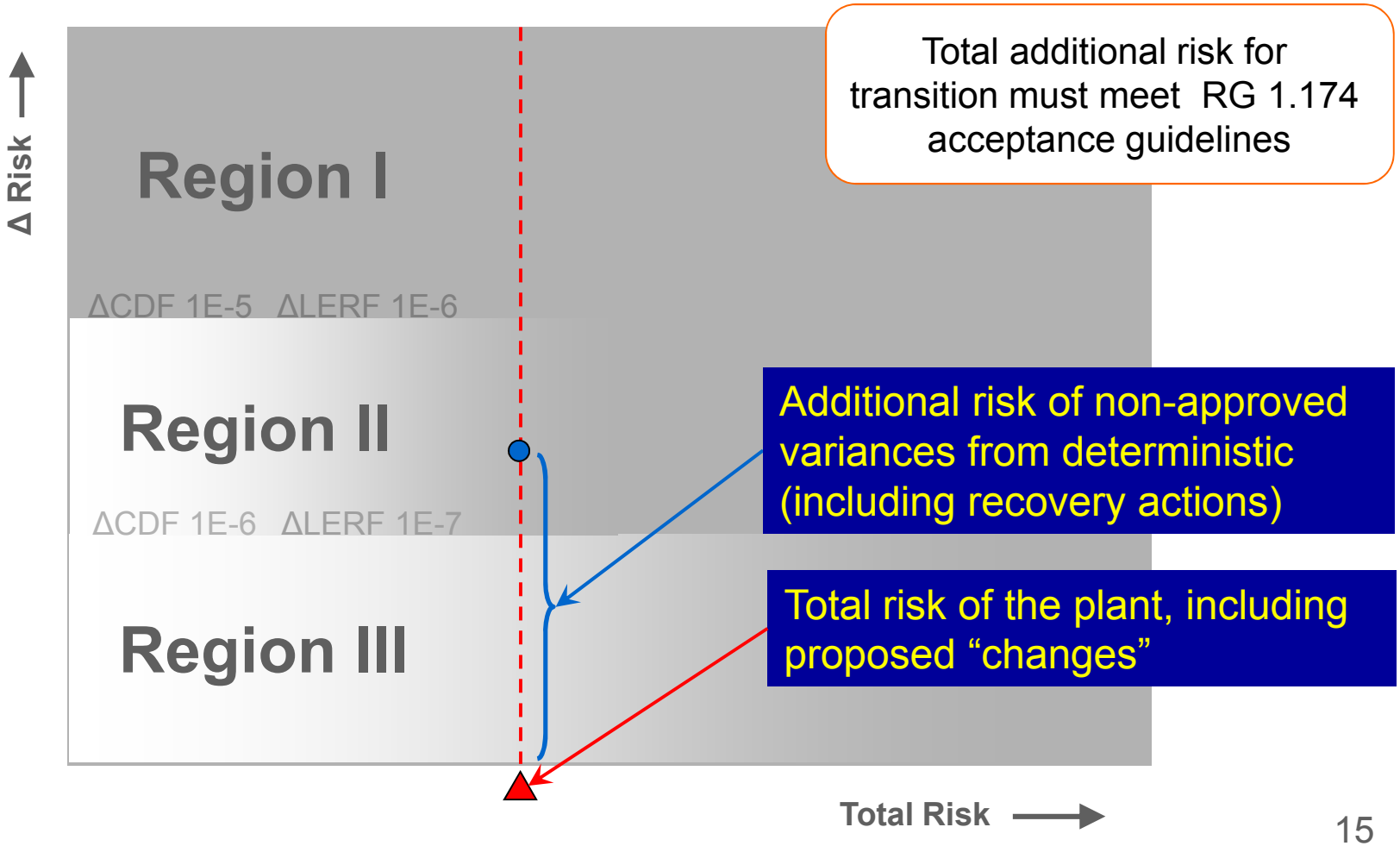
- NFPA 805 requires use of performance-based methods for recovery actions on the credited train
- It also requires that the additional risk of these recovery actions be evaluated
  - Fire modeling – NFPA 805 § 4.2.4.1
  - Fire risk evaluation – NFPA 805 § 4.2.4.2
- The *fire risk evaluation* requires that the additional risk (ΔCDF; ΔLERF) be evaluated

Recovery Actions (cont'd)

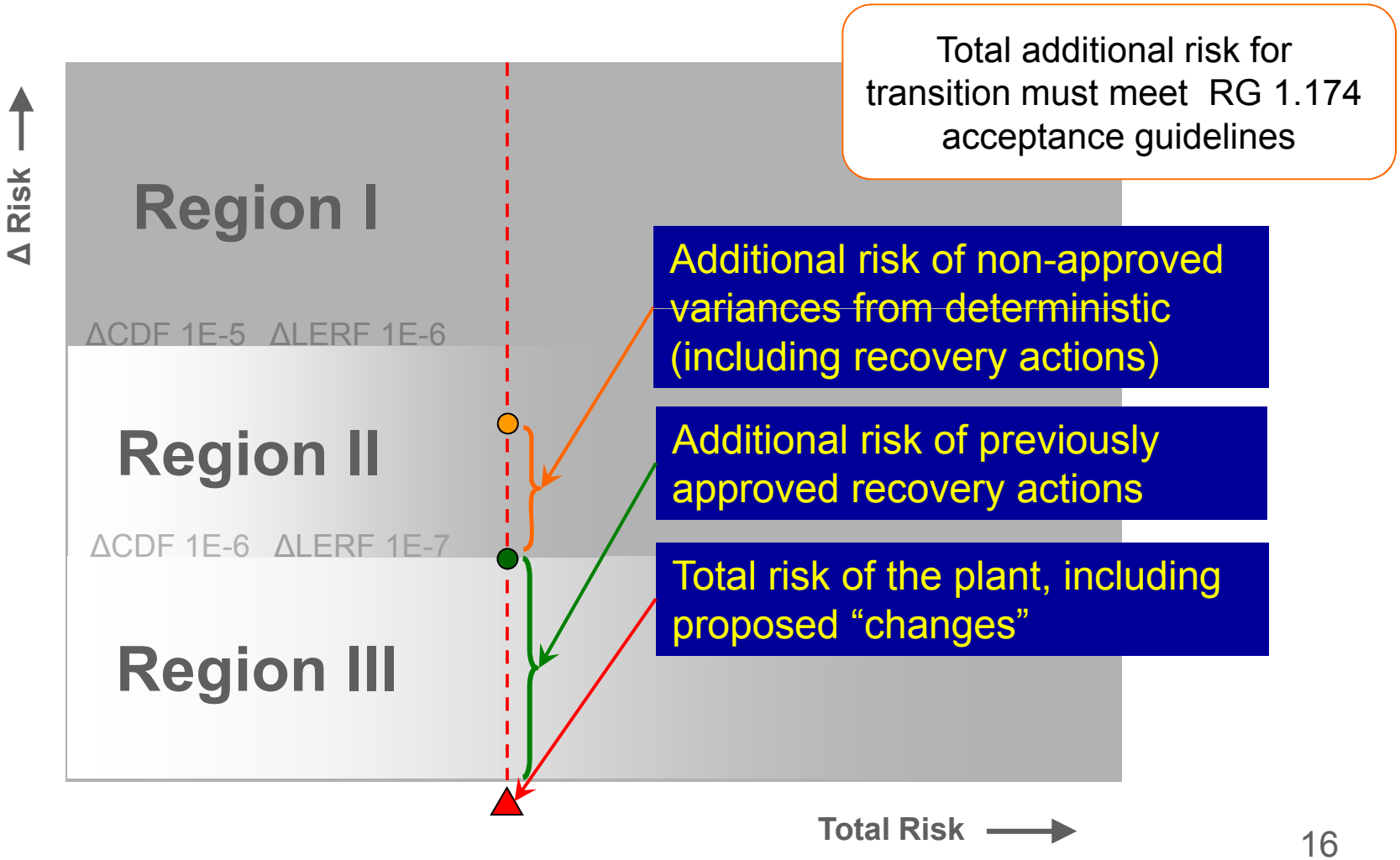
- Two cases when using fire risk evaluation:
  - Recovery Action was previously approved by NRC
  - Recovery Action was not previously approved
- If previously approved by NRC:
  - The risk is acceptable based on previous approval*
  - This additional risk is considered when evaluating the acceptability of other, proposed risk contributions when using the performance-based approach
- If not previously approved – RG 1.174 acceptance guidelines

*Unless circumstances indicate that a backfit under 10 CFR 50.109 is warranted on an adequate protection or cost-beneficial safety improvement basis.

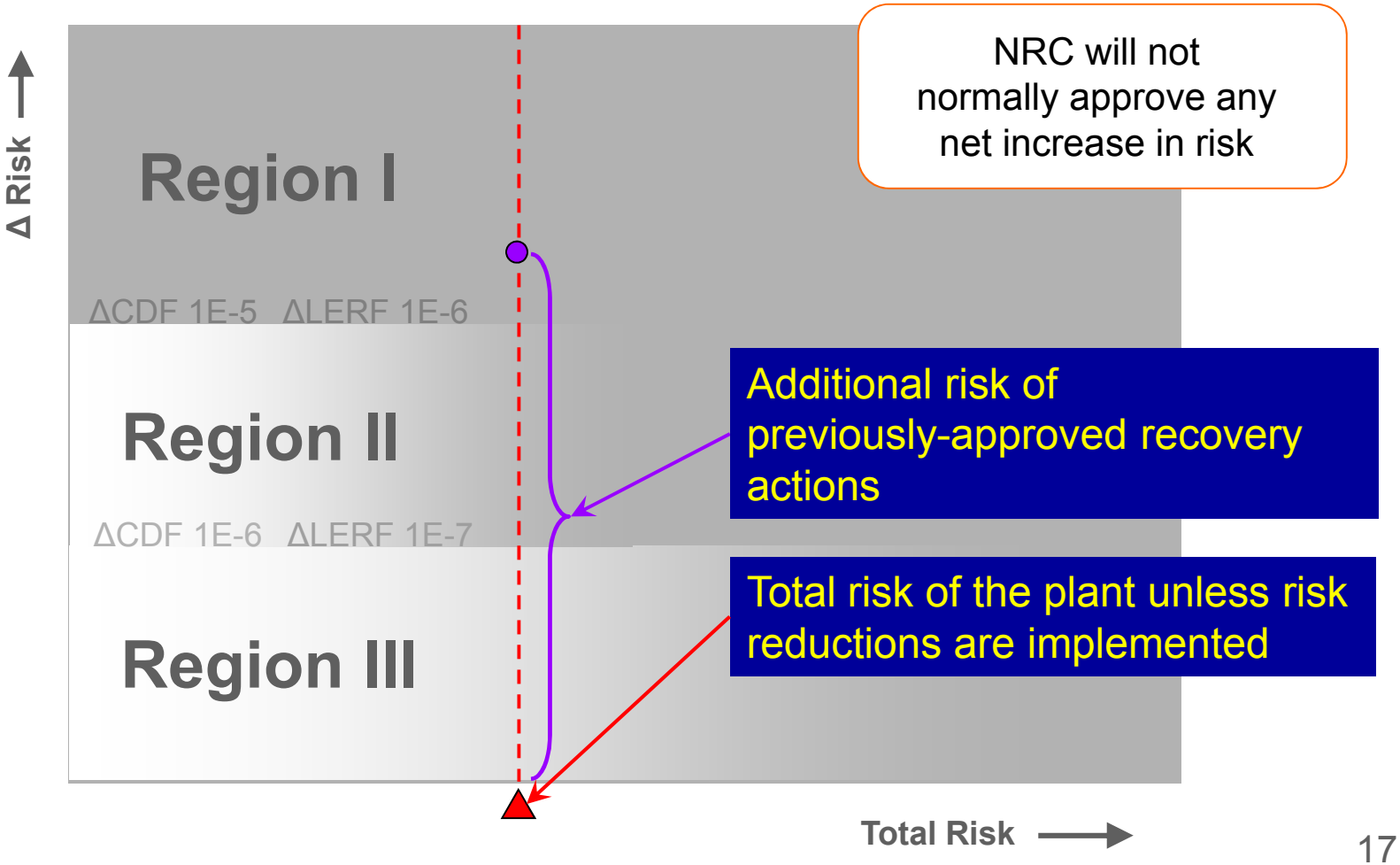
Case 1: There are No Previously Approved Recovery Actions



Case 2: Additional Risk of Previously-Approved Recovery Actions Is Within RG 1.174



Case 3: Additional Risk of Previously-Approved Recovery Actions Exceeds RG 1.174



Recovery Actions (cont'd)

- When using fire risk evaluation ΔCDF and ΔLERF
  - Should be considered for each fire area
  - Should be considered for overall transition (sum the risk increases and decreases from each fire area)

Existing Licensing Basis

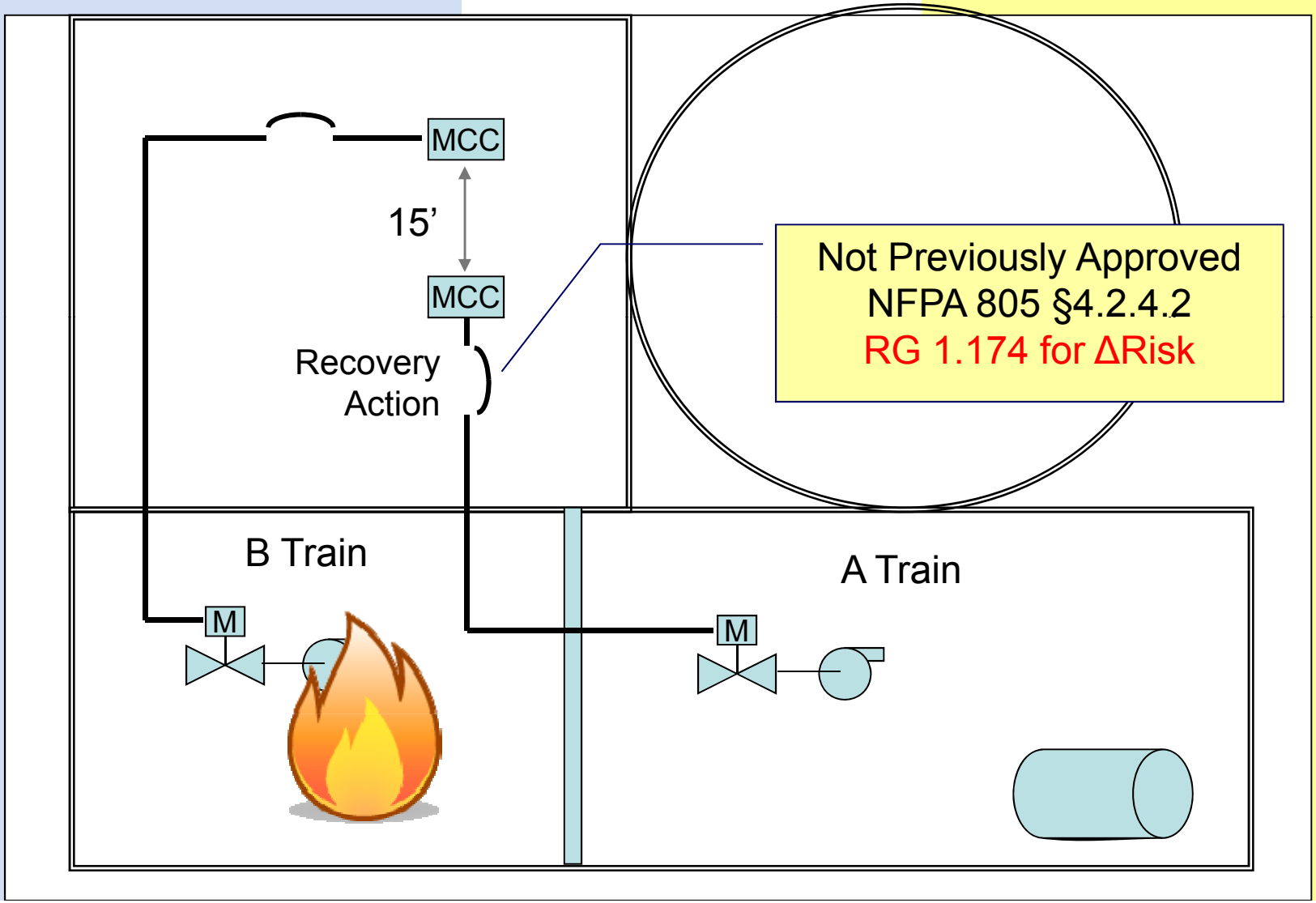
Variances – Non-approved
Operator Manual Actions

TRANSITION

- Fire modeling or Fire Risk
- Additional risk of recovery actions

NFPA 805 Licensing Basis

Meet NFPA 805 §4.2.4.1
Meet NFPA 805 §4.2.4.2
Meet 10 CFR 50.48(c)



Existing Licensing Basis

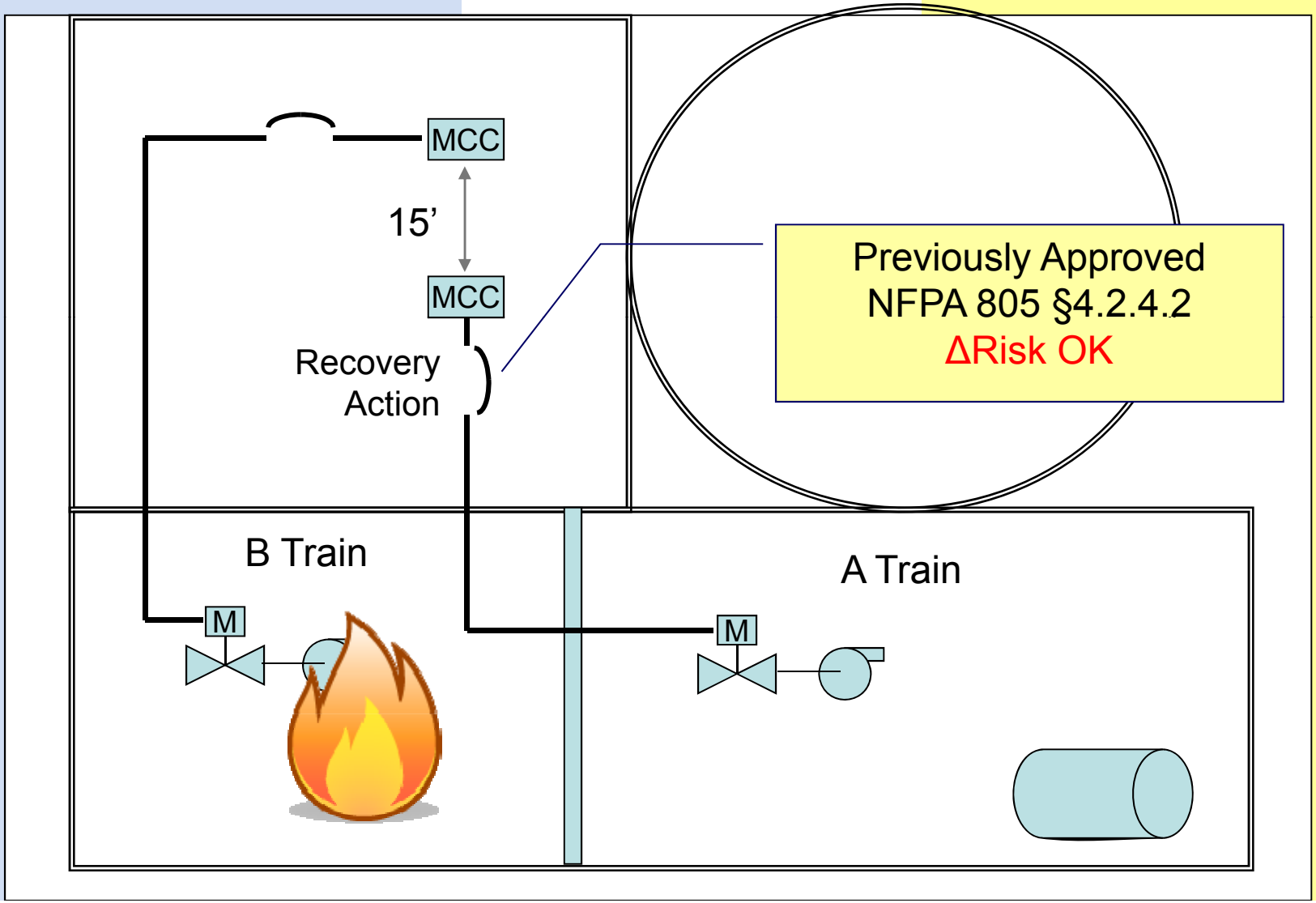
App R III.G.2 Exemption
Operator Manual Action
in lieu of Equipment

TRANSITION

- Provide ΔCDF and ΔLERF
- ΔRisk OK – previously approved

NFPA 805 Licensing Basis

Meets §4.2.4
performance-based



What about fire PRA quality?

- Fire PRA technical adequacy – 2 aspects
  - Underlying PRA (i.e., the baseline model)
  - Analyses, assumptions, and approximations to map the cause-effect relationship associated with the application
- Method for addressing
  - Baseline PRA - conform to the peer review and self assessment processes in RG 1.200
  - Risk assessments - describe the specific modeling of each cause-effect relationship associated with the application
- Submittal guidance
  - Submit the documentation described in Section 4.2 of RG 1.200
  - Capability Category (CC) II of PRA standard is generally acceptable
  - Justify use of CC I for specific supporting requirements
  - Evaluate whether parts of the PRA need to meet CC III

Fire PRA – Methods

- Licensee may model cause/effect relationship with methods
  - That have been used in the peer-reviewed baseline PRA;
  - That have been endorsed by NRC through a license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments; or,
  - That have been demonstrated to bound the risk impact.
- The Standard License Condition reflects this change

Risk Evaluations

- Two similar (but different) risk evaluations in NFPA 805
  - Fire Risk Evaluations
    - Performed during transition to demonstrate adequacy of an alternate to the deterministic criteria
    - Performed for each fire area and total for plant
  - Plant Change Evaluations
    - Changes to the "previously approved FPP"
    - Cumulative risk must be considered
      - Cumulative starts at implementation of NFPA 805 (including all necessary modifications)
    - After transition is complete, the baseline for evaluating the cumulative affect of changes to the fire protection program will be the total plant risk at implementation of NFPA 805

Can a licensee self-approve before full implementation of NFPA 805?

- Transition License Conditions:

  (1) Before achieving full compliance with 10 CFR 50.48(c), as specified by (2) below, risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change clearly does not increase risk

- Risk-informed self approval of changes
  - Limited to those changes for which the risk assessment methods are adequate
  - Risk evaluation based on approaches for modeling the cause and effect relationship as discussed earlier
  - Document per RG 1.200, Section 4

Self Approval (cont'd)

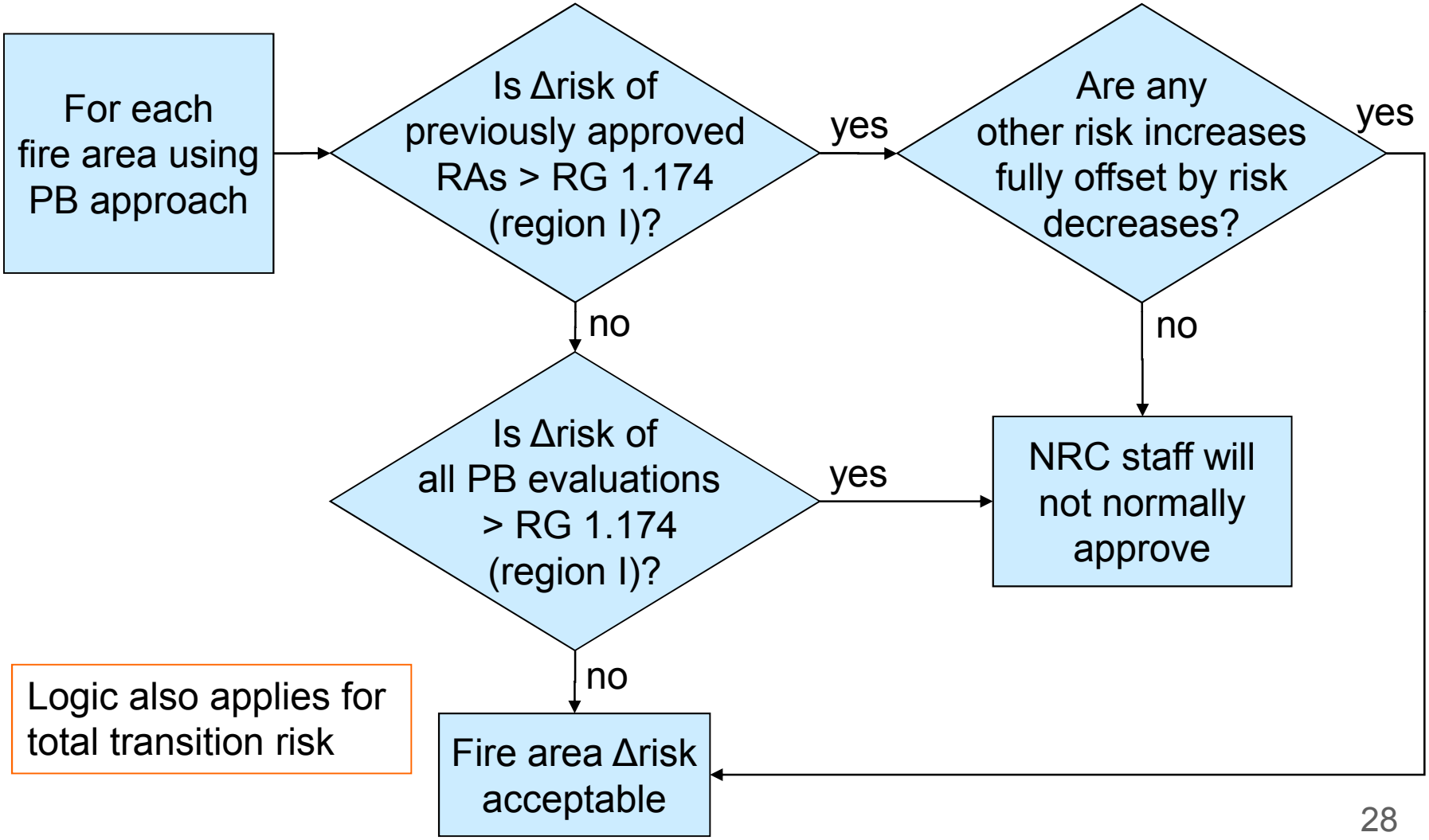
- Performance-based changes to NFPA 805 Chapter 3 fundamental FPP elements and design requirements
  - Changes where engineering evaluation demonstrates that the alternative is
    - functionally equivalent; or,
    - adequate for the hazard.
  - Latter category applies only to parts of Chapter 3 invoked by NFPA 805 Chapter 4
    - Fire Alarm and Detection Systems
    - Automatic and Manual Water-Based Fire Suppression Systems
    - Gaseous Fire Suppression Systems
    - Passive Fire Protection Features

Summary

- Several drivers for a revision to RG 1.205
- Goal was to foster full and scrutable compliance
- NRC staff seeks to publish guidance that clearly shows how compliance could be achieved without creating unnecessary burden to licensees
- RG 1.205 Rev. 1 clarifies the guidance where necessary and adds guidance that was missing from the initial Regulatory Guide

Questions?

Application of RG 1.174 to NRC Staff Review During Transition (by Fire Area)



Logic also applies for total transition risk