



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

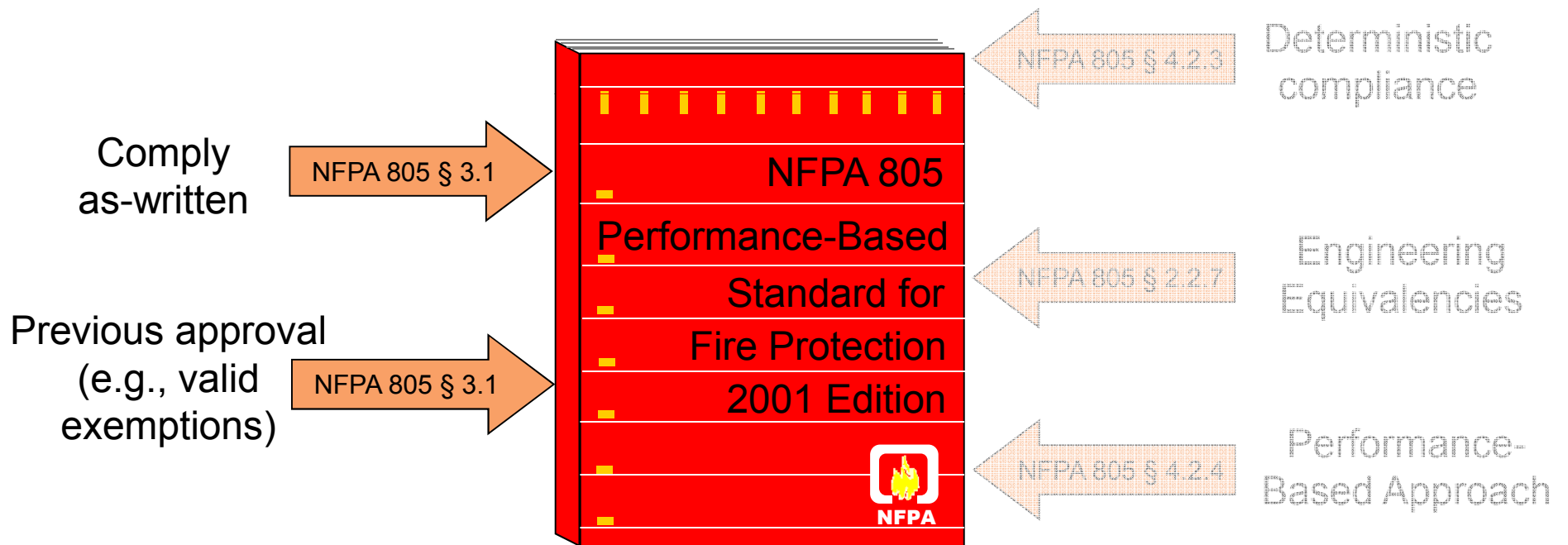
How does Rev. 1 affect transition?

- 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

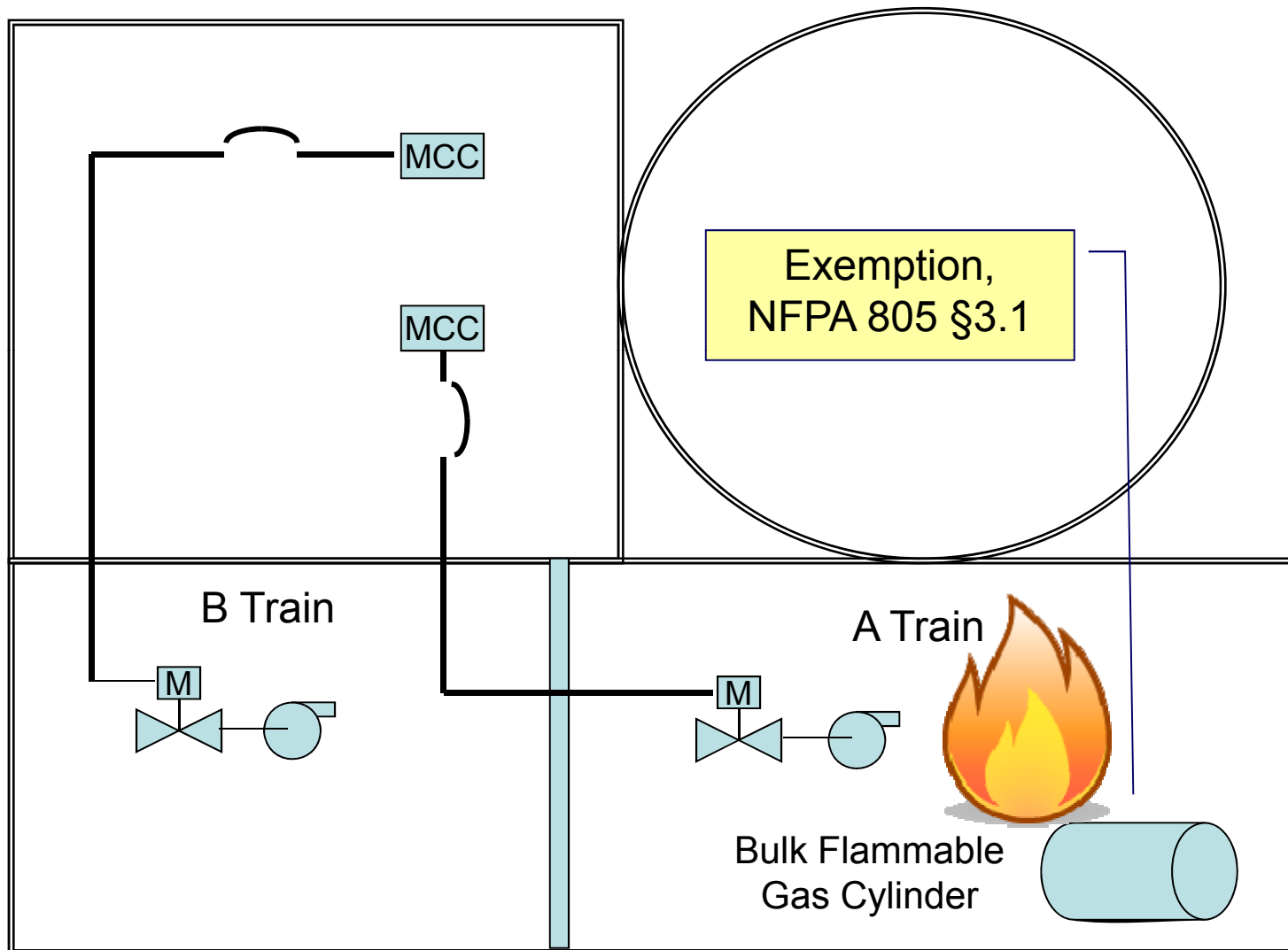
NFPA 805 Compliance (Ch 3)

Chapter 3: Fundamental Fire Protection Program and Design Elements

Chapter 4: Determination of Fire Protection Systems and Features



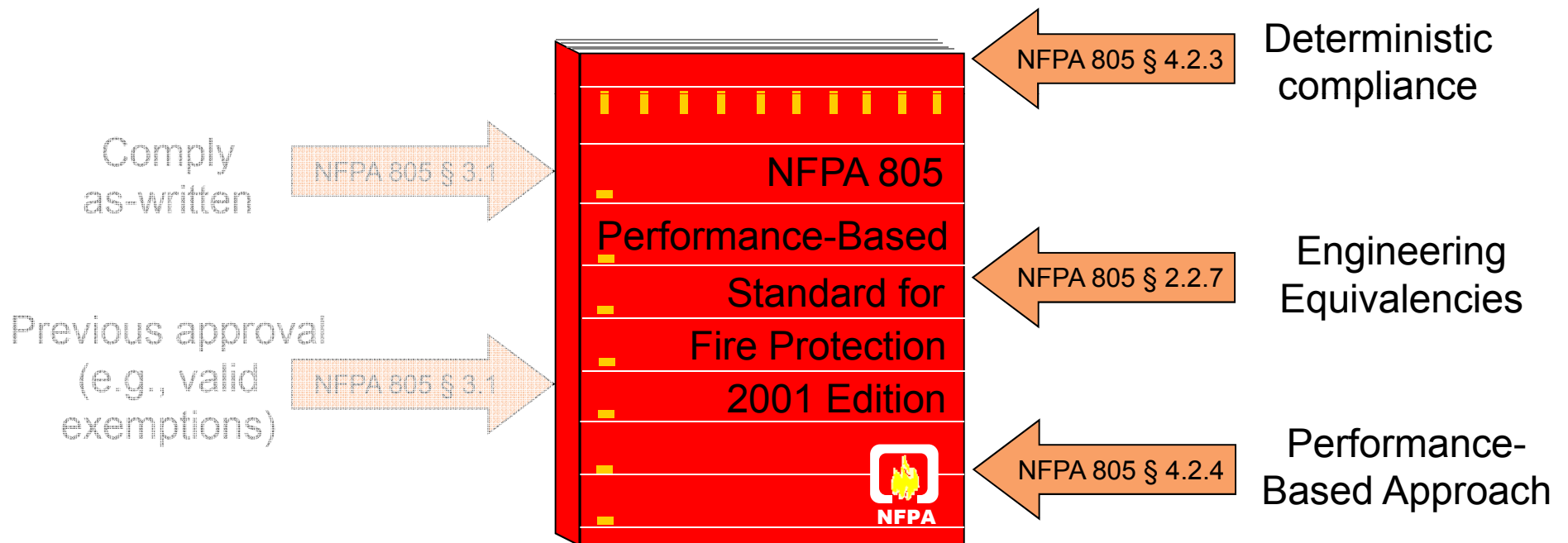
Chapter 3 Compliance Example



NFPA 805 Compliance (Ch 4)

Chapter 3: Fundamental Fire Protection Program and Design Elements

Chapter 4: Determination of Fire Protection Systems and Features



Existing Licensing Basis

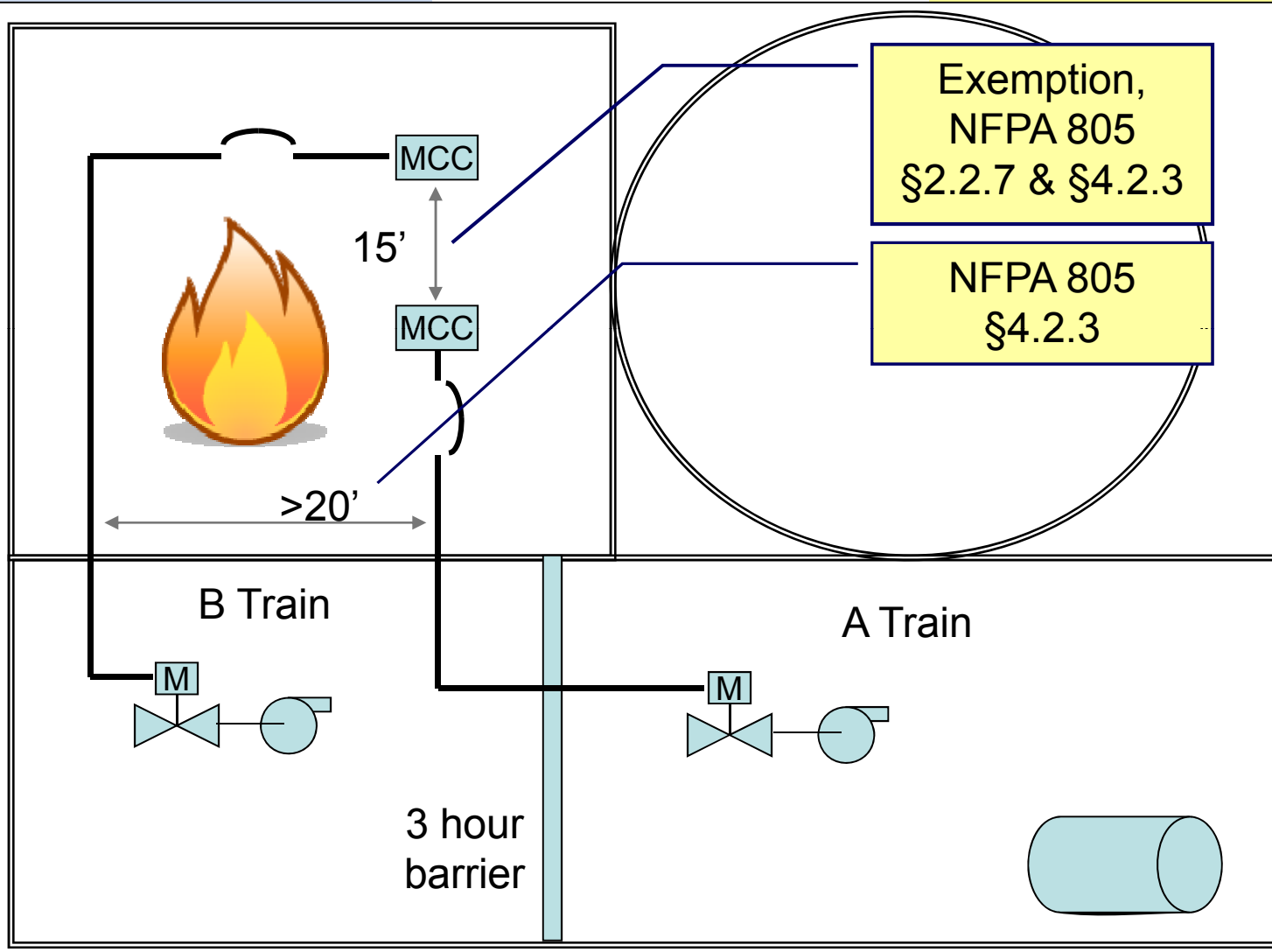
App R III.G.2
Separation, barriers,
detection, suppression

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

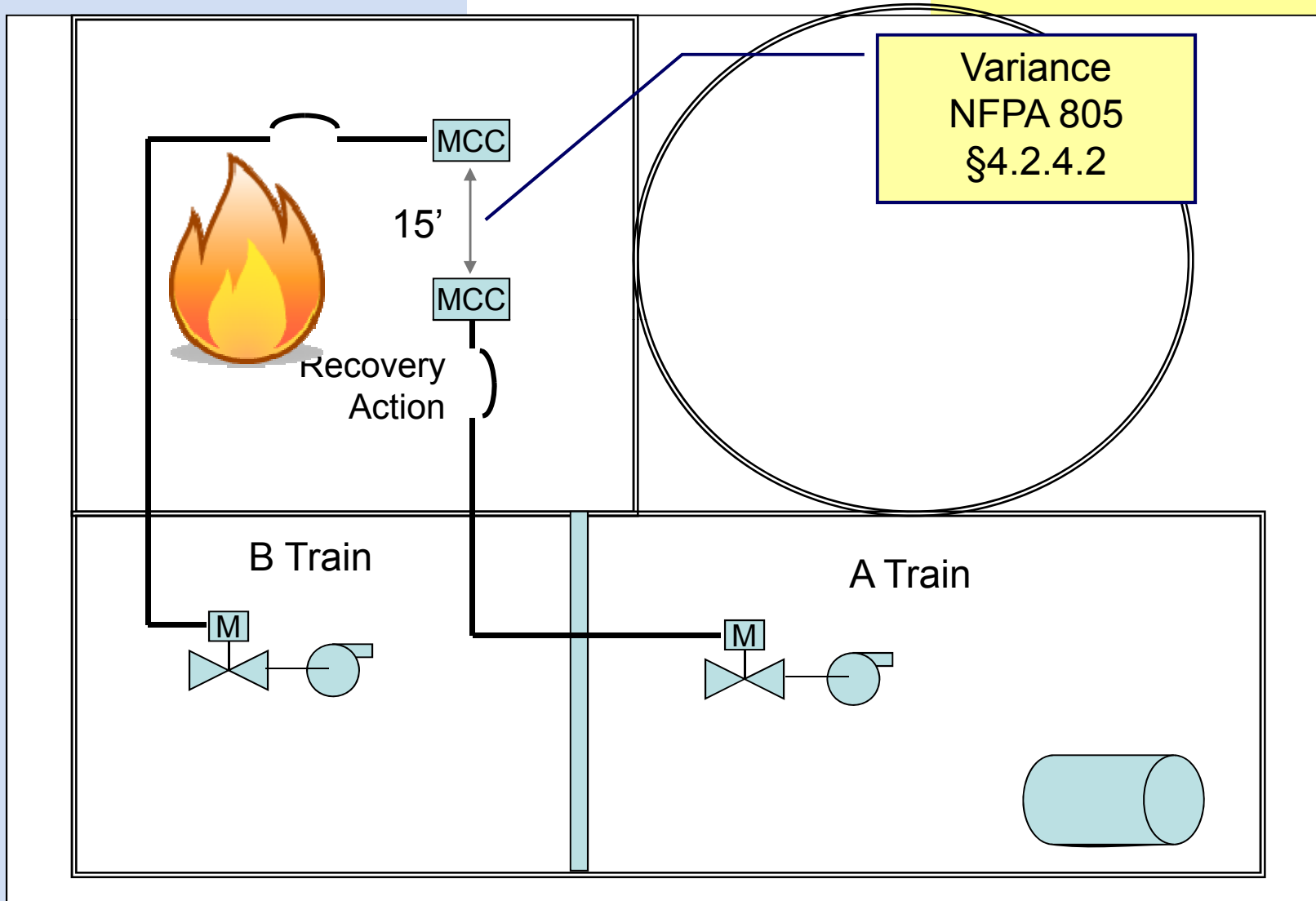
Variances – Non-approved
Cables and Equipment

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

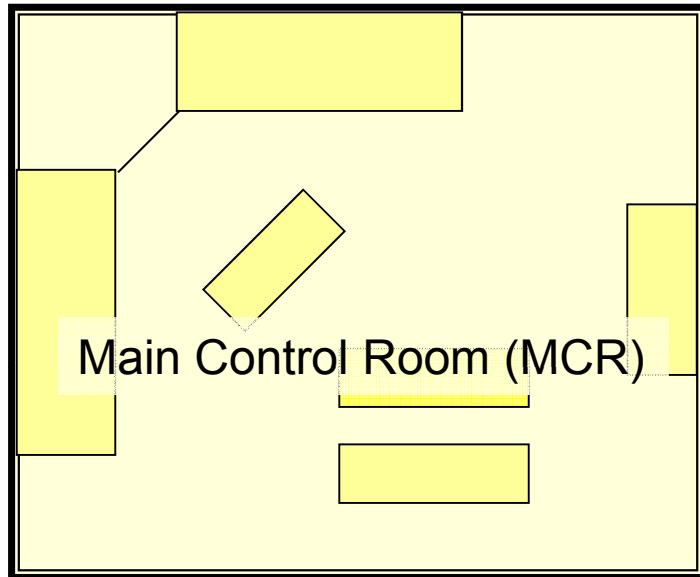
App R III.G.3 Actions
“Dedicated” shutdown
“Alternative” shutdown

TRANSITION

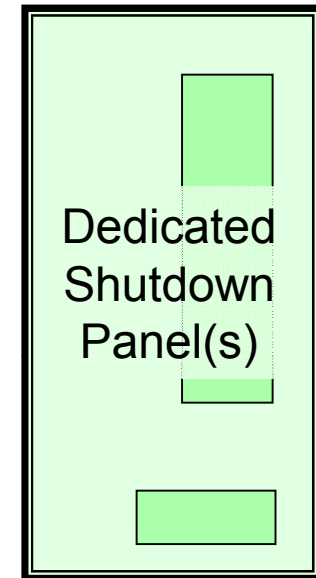
- Verify previous approval
- Verify “alternative” meets RG 1.205

NFPA 805 Licensing Basis

Meets §4.2.3
deterministic criteria
(not recovery actions)



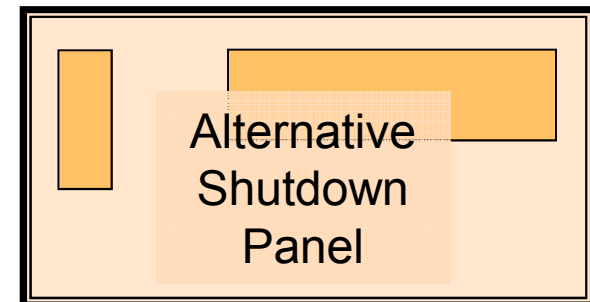
Actions in Control Room &
at Dedicated Shutdown*
Panels – NOT recoveries
when primary control
shifted from MCR



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)

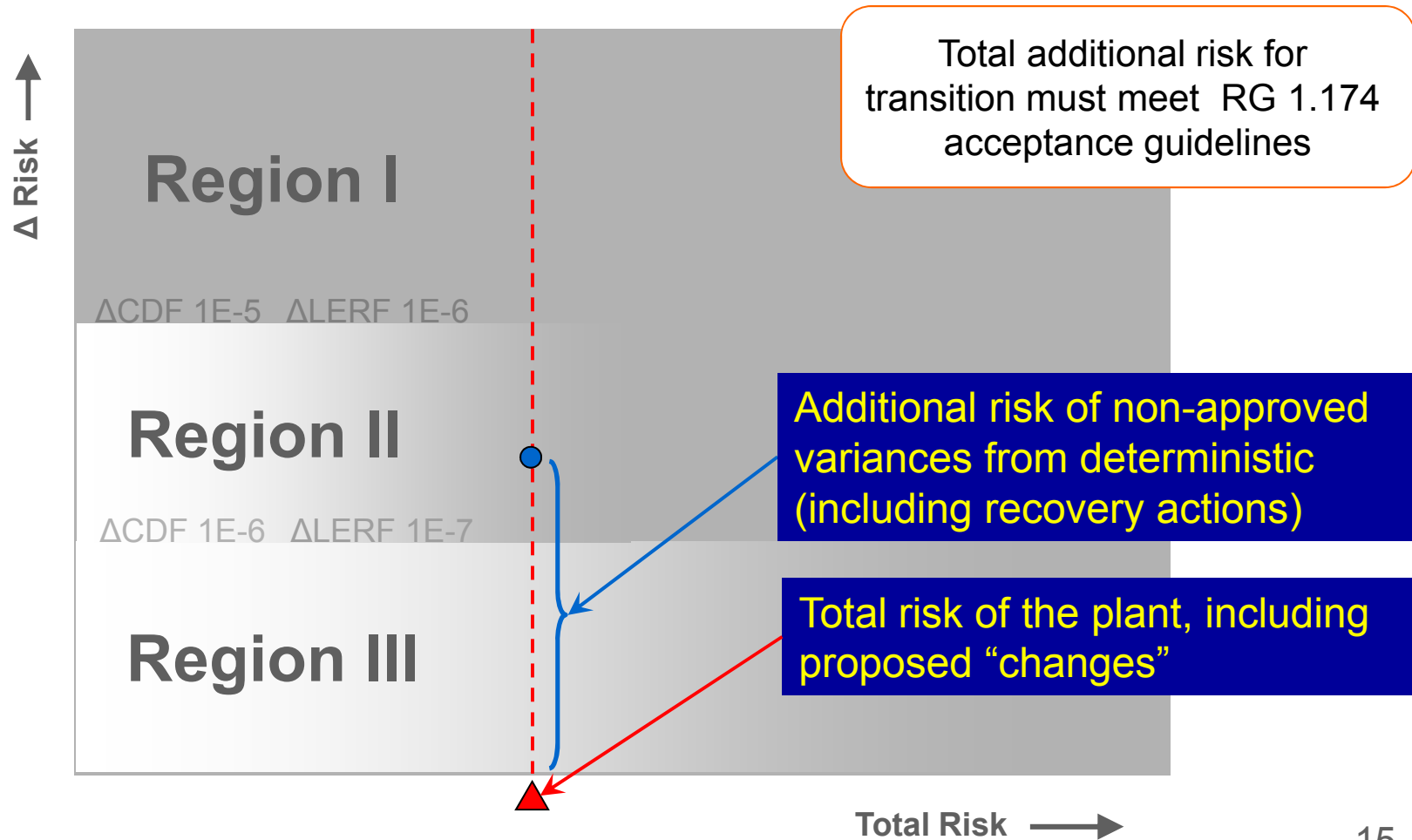
- NFPA 805 requires use of performance-based methods for recovery actions on the credited train
- It also requires that the additional risk of these recovery actions be evaluated
 - Fire modeling – NFPA 805 § 4.2.4.1
 - Fire risk evaluation – NFPA 805 § 4.2.4.2
- The *fire risk evaluation* requires that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

Recovery Actions (cont'd)

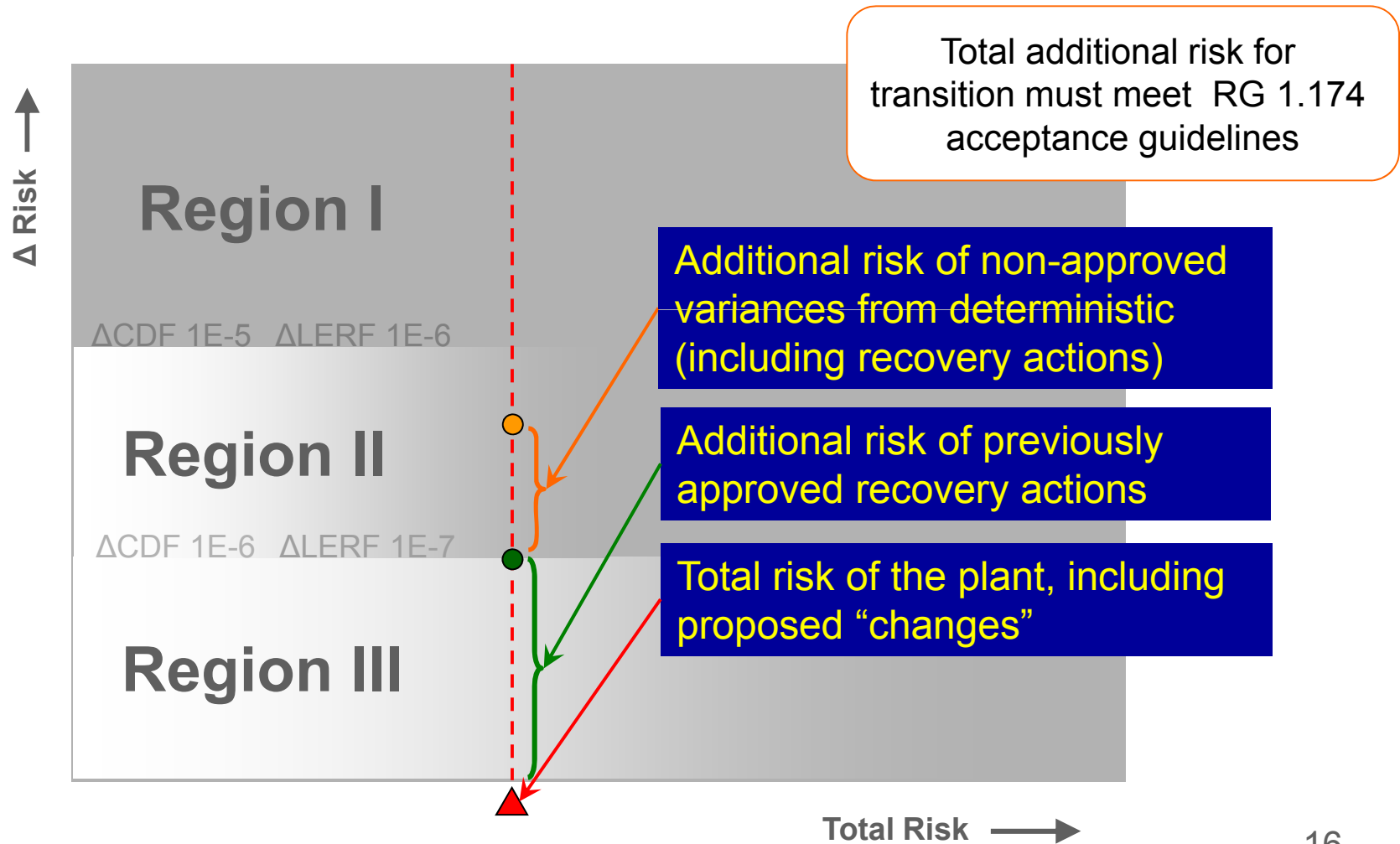
- Two cases when using fire risk evaluation:
 - Recovery Action was previously approved by NRC
 - Recovery Action was not previously approved
- If previously approved by NRC:
 - The risk is acceptable based on previous approval*
 - This additional risk is considered when evaluating the acceptability 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.

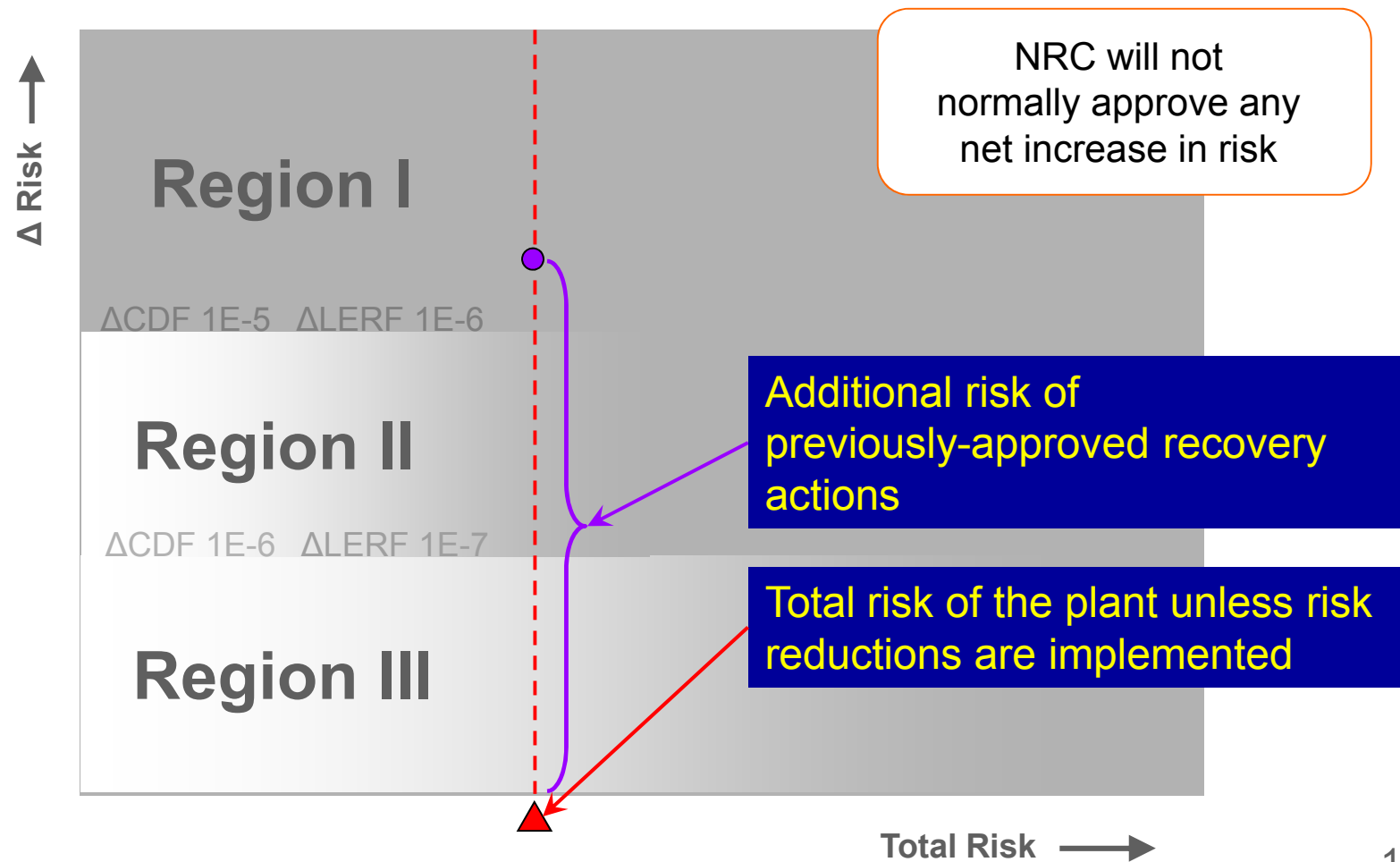
Case 1: There are No Previously Approved Recovery Actions



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 $\Delta LERF$
 - 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

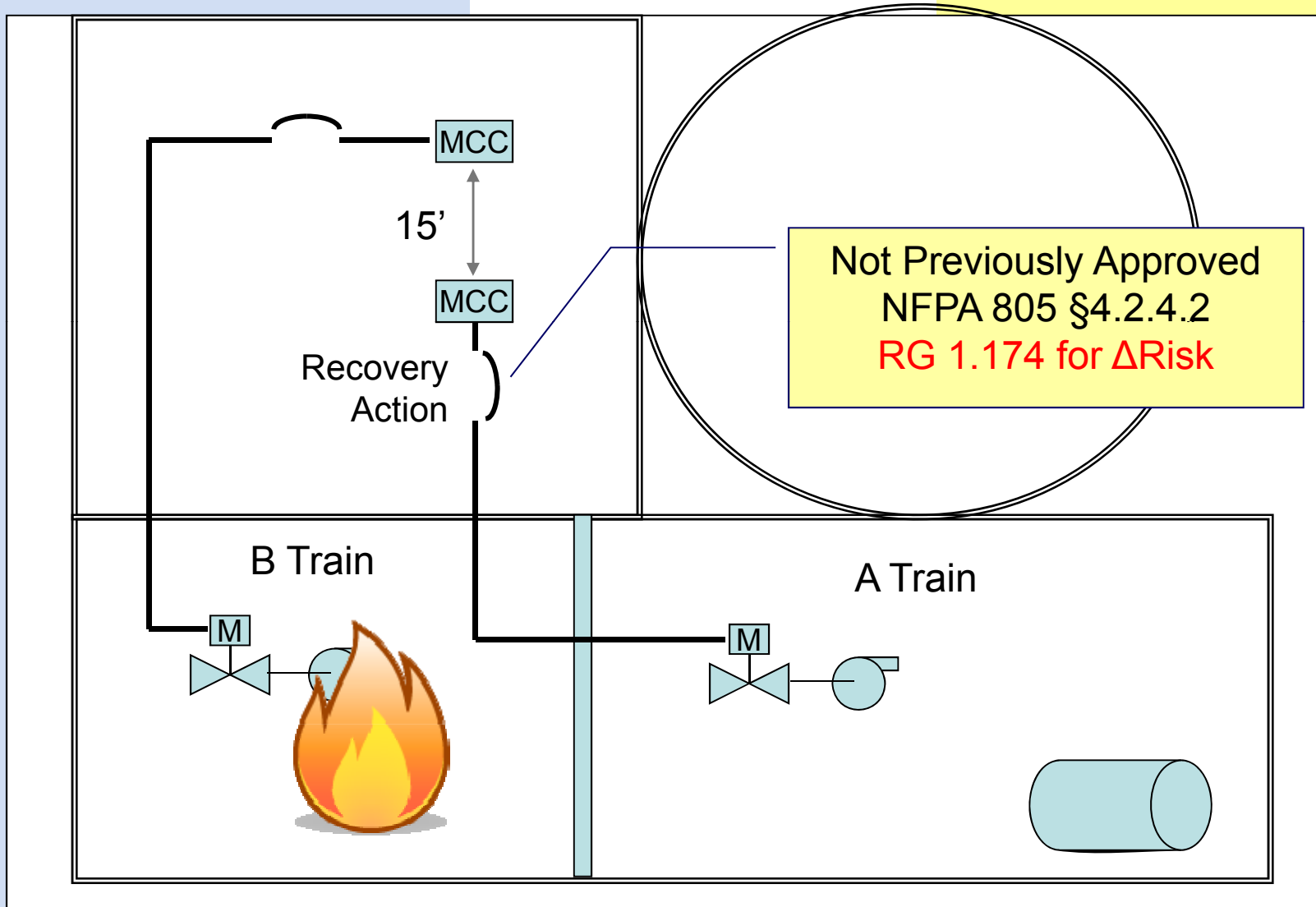
Variances – Non-approved
Operator Manual Actions

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

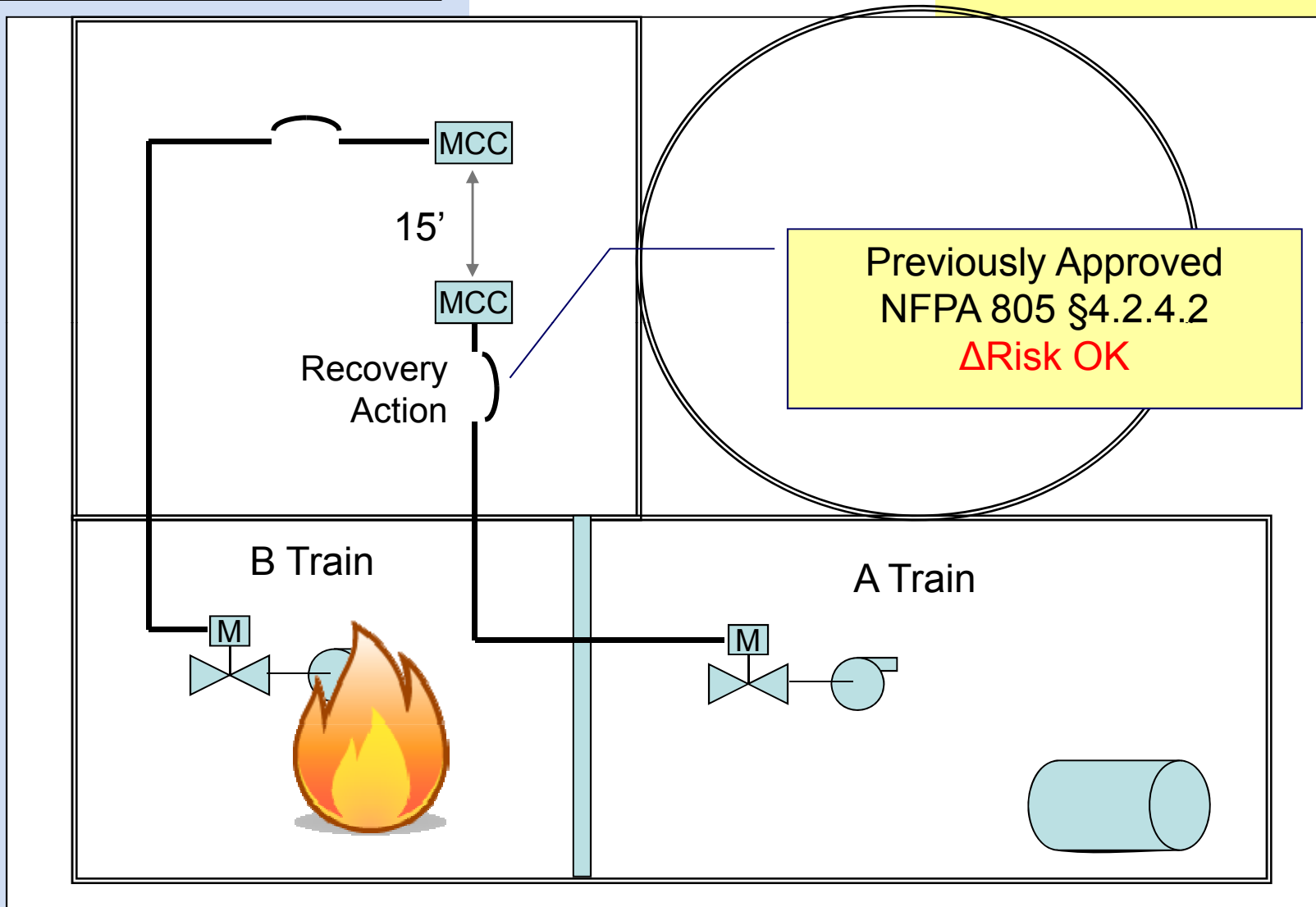
App R III.G.2 Exemption
Operator Manual Action
in lieu of Equipment

TRANSITION

- Provide Δ CDF and Δ LERF
- Δ Risk 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)

