



Power Reactor Fire Protection

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Overview

- History of Fire Protection
- U.S. Fire Protection Regulations
 - Prescriptive Requirements of 10 CFR 50.48(b)
 - Performance-Based, Risk-Informed Requirements of 10 CFR 50.48(c)
- Plant Modifications under 10 CFR 50.48(c)

History of Fire Protection



Construction of Browns Ferry Unit 1

- Early nuclear power plant fire protection features were consistent with other large industrial facilities
- Fire protection was not recognized as a significant nuclear safety issue
- March 22, 1975: Fire at Browns Ferry Nuclear Power Plant revolutionized nuclear fire protection regulation

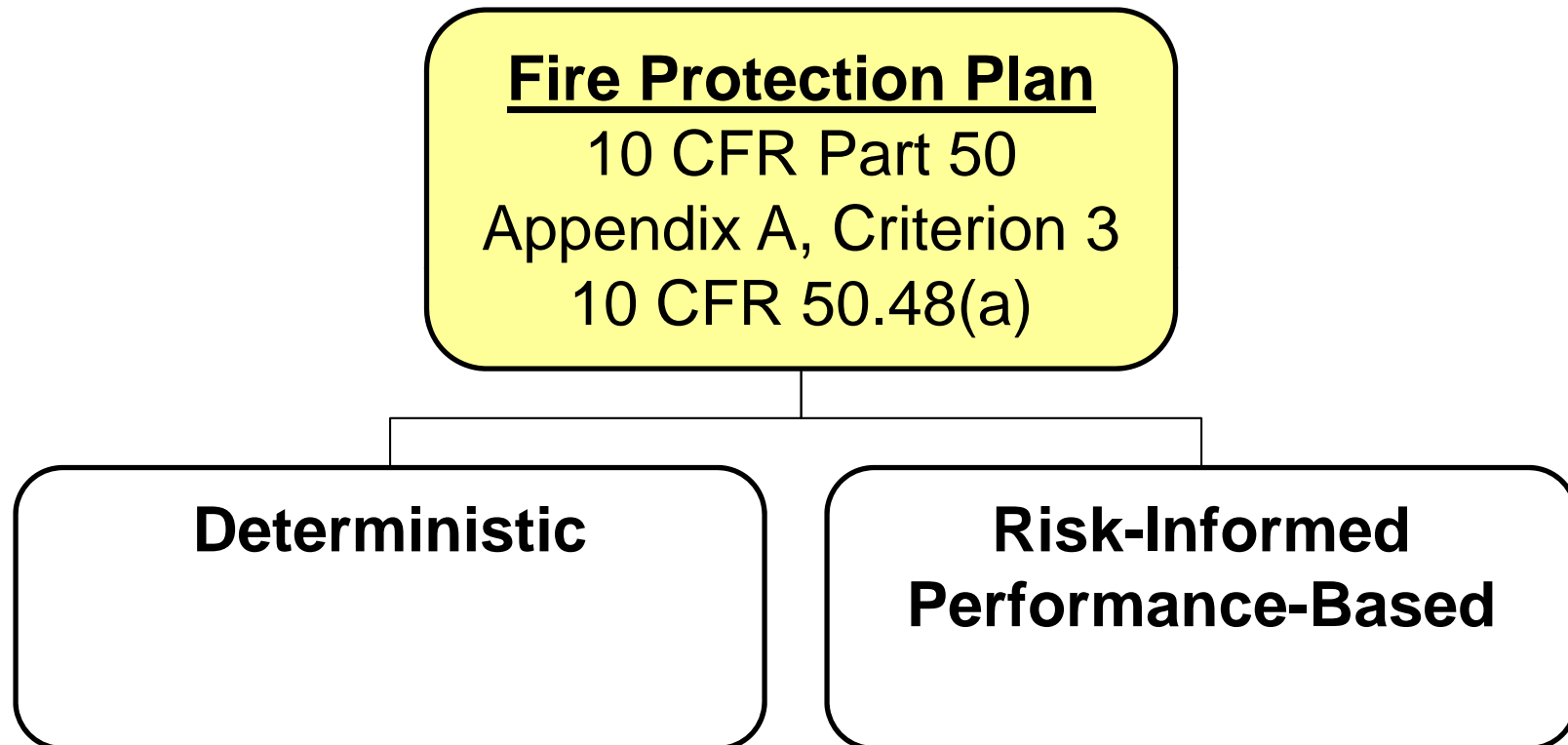
Background on Fire Protection

- In the late 1970s, following the Browns Ferry fire event, the NRC created extensive fire protection guidance and requirements for operating nuclear power plants to upgrade fire protection
 - Branch Technical Position - guidance
 - 10 CFR 50, Appendix R contains prescriptive requirements
- In the early 2000s, the NRC issued a new risk-informed, performance-based alternative approach to fire protection

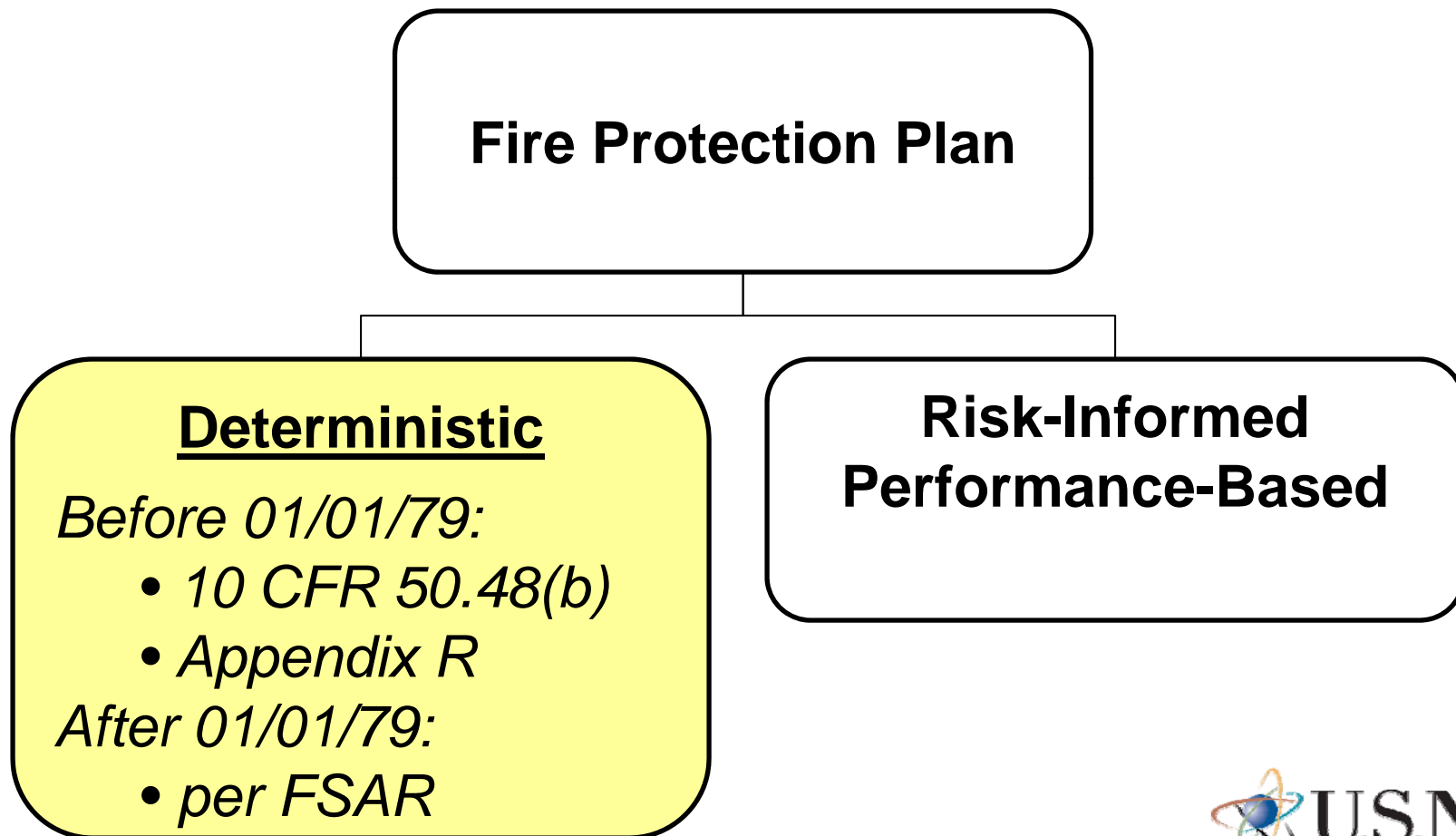
U.S. Fire Protection Regulations

- The NRC requires a robust fire protection program at every commercial nuclear power plant in the U.S.
- Two approaches are available to meet current NRC regulations
 - 1) Deterministic
 - 2) Risk-Informed, Performance-Based

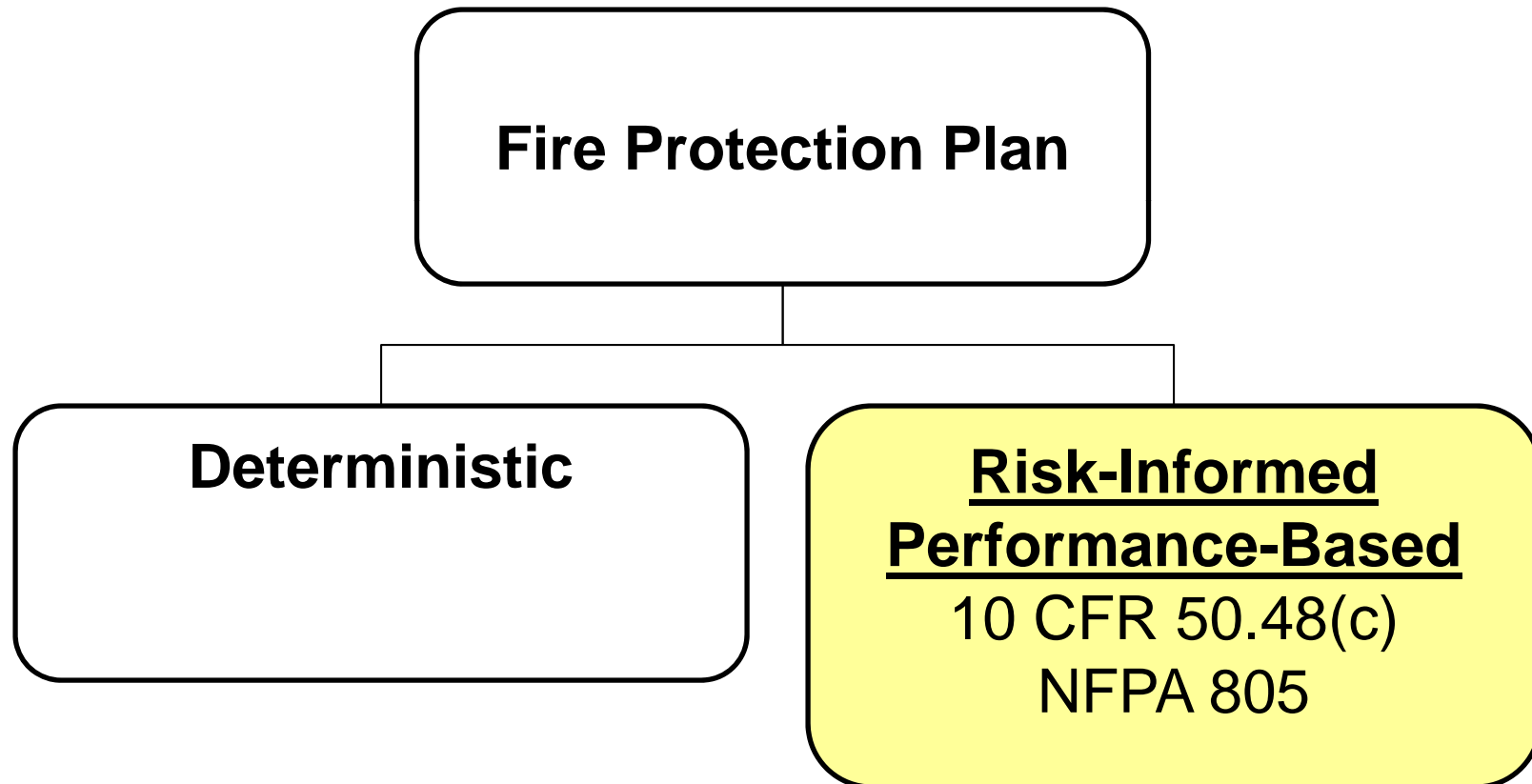
U.S. Fire Protection Regulations



U.S. Fire Protection Regulations



U.S. Fire Protection Regulations



Deterministic versus Risk-informed, Performance-Based Approach

Appendix R

- Prescriptive Requirements
- Rule allowed exemptions
- Resources focused on addressing prescriptive requirements
- Maintains defense-in-depth

NFPA 805

- Performance-based, Risk-informed
- Self-approval for certain changes
- Resources focused on higher risk areas
- Maintains defense-in-depth

Power Reactors in South Carolina

Operating power reactors in South Carolina

- Oconee 1, 2, 3 – 10CFR50.48(c) license amendment approved 2010
- VC Summer 1 - 10CFR50.48(c) license amendment scheduled Nov 2014
- Catawba 1, 2 - 10CFR50.48(c) license amendment scheduled Oct 2015
- Robinson 2 - 10CFR50.48(c) license amendment scheduled Oct 2015

NFPA 805 Modifications

- Examples of modifications made or proposed to resolve fire risk
 - Protected Service Water (Oconee)
 - Alternate Seal Injection (VC Summer)
 - Relocate or reroute cables (Catawba)
 - Additional Fire Protection Systems (Robinson)

Summary

- The NRC requires a robust fire protection program at every commercial nuclear power plant in the U.S.
- The deterministic or the risk-informed, performance-based approach provides adequate fire safety
- Some of the enhancements made during NFPA 805 transitions have benefits in other programs

Additional Information

Documents available on NRC web site or in the Agencywide Documents Access and Management System (ADAMS) by entering the below listed document specific ML##### at

<http://www.nrc.gov/reading-rm/adams.html>

GENERAL FIRE PROTECTION REFERENCES

Fire Protection (NRC Public Web Site)

<http://www.nrc.gov/about-nrc/fire-protection.html>

10 CFR 50.48, "Fire Protection"

<http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-0048.html>

10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power plants"

<http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appa.html>

Additional Information

DETERMINISTIC FIRE PROTECTION REFERENCES

10 CFR 50, Appendix R, "Fire Protection Program for Nuclear Facilities Operating Prior to January 1, 1979"

<http://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appr.html>

Regulatory Guide 1.189, Revision 2 "Fire protection for Nuclear Power Plants"

<http://pbadupws.nrc.gov/docs/ML0925/ML092580550.pdf>

GL 86-10, "Implementation of Fire Protection Requirements", dated April 24, 1986

<http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/1986/gl86010.html>

NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire"

<http://pbadupws.nrc.gov/docs/ML0730/ML073020676.pdf>

NUREG/BR-0361 "The Browns Ferry Nuclear Plant Fire of 1975 and the History of NRC Fire Regulations"

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0361/>

Additional Information

RISK-INFORMED FIRE PROTECTION REFERENCES

NFPA 805, “Performance-Based Standard for Fire Protection for Existing Light Water Reactor Electric Generating Plants,” 2001 Edition

Regulatory Guide 1.205, “Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants”

<http://pbadupws.nrc.gov/docs/ML0927/ML092730314.pdf>

Standard Review Plan, Section 9.5.1.2, “Risk-Informed, Performance-Based Fire Protection

<http://pbadupws.nrc.gov/docs/ML0925/ML092590527.pdf>

Additional Information

U.S. Government Accountability Office report GAO-13-8, “NUCLEAR REGULATORY COMMISSION, Oversight and Status of Implementing a Risk-Informed Approach to Fire Safety

<http://www.gao.gov/products/GAO-13-8>