

NOTEBOOK MATERIAL

FOR THE 568th ACRS FULL COMMITTEE MEETING, DECEMBER 3-5, 2009

RELATED TO THE DRAFT FINAL REGULATORY GUIDE 1.205, "RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION FOR EXISTING LIGHT-WATER NUCLEAR POWER PLANTS" AND DRAFT FINAL SRP 9.5.1.2, "RISK-INFORMED PERFORMANCE-BASED FIRE PROTECTION"

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References:

1. Draft Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, October 2009.
2. Draft Standard Review Plan, 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection Program" Rev. 0, January 2009.
3. NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition.
4. NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c)," Rev. 2, April 2008.

Cognizant ACRS Member:
Cognizant ACRS Staff Engineer:

George Apostolakis
Girija Shukla

**568TH MEETING
 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
 ROCKVILLE, MD
 DECEMBER 3, 2009**

- PROPOSED AGENDA -

Cognizant Staff Engineer: Girija Shukla, gss@nrc.gov 301-415-6855

Subject: Draft Final Regulatory Guide 1.205, Revision 1, “Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants,” and Draft Final Standard Review Plan (SRP) Section 9.5.1.2, “Risk-Informed, Performance-Based Fire Protection Program”

Topic		Presenter(s)	Time
Thursday, December 3, 2009			
1	Opening Remarks and Objectives	Dr. George Apostolakis, ACRS	10:15 – 10:20 AM
2	Opening Remarks	NRR/DRA Management	10:20 – 10:30 AM
3	NRC staff presentation on proposed Draft Final Regulatory Guide 1.205, Revision 1, and proposed final SRP Section 9.5.1.2	Steven Laur, NRR/DRA	10:30 – 12.00 PM
4	Committee Discussion	Dr. George Apostolakis, ACRS	12:00 – 12:15 PM

Notes:

- During the meeting, Telephone No. 301-415-7360 should be used to contact anyone in the ACRS Office.
- Presentation time should not exceed 50 percent of the total time allocated for a given item. The remaining 50 percent of the time is reserved for discussion.
- Thirty five (35) hard copies of each presentation or handout should be provided to the Designated Federal Official 30 minutes before the meeting.
- One (1) electronic copy of each presentation should be emailed to the Designated Federal Official 1 day before the meeting. If an electronic copy cannot be provided within this timeframe, presenters should provide the Designated Federal Official with a CD containing each presentation at least 30 minutes before the meeting.

**568TH MEETING
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
RELIABILITY AND PRA SUBCOMMITTEE
ROCKVILLE, MD
DECEMBER 3, 2009**

STATUS REPORT

PURPOSE

The purpose of this meeting is to review Revision 1 to Regulatory Guide 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants." During the meeting, the Committee will hear presentations by and hold discussions with representatives of the staff. The staff also requests ACRS endorse Draft Final Standard Review Plan (SRP) Section 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection Program" which is the accompanying SRP with this Regulatory Guide.

The Reliability and PRA Subcommittee has reviewed this matter during the meetings held on June 1, August 18, and November 13, 2009. During these meetings the Subcommittee had the benefit of discussions with representatives of the NRC staff and the industry.

BACKGROUND

Originally, fire protection at nuclear power plants was governed by the same fire protection codes as any major industrial organization. However, the situation changed after a fire occurred in the Browns Ferry plant in the mid-1970s. In that incident, a fire in the cable spreading room under the main control room disabled most of the safety systems in the plant, and, had the control rod drive pumps not been available, the plant might well have had a serious accident.

The NRC later developed detailed requirements for fire protection and prevention, which were issued as regulations - 10 CFR 50.48, "Fire Protection," and 10 CFR 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979."

The original requirements were completely prescriptive – they applied to all areas of the plant equally, regardless of the safety significance of the equipment located within any fire zone. Starting in the mid-1990s, efforts were begun to develop a more risk-informed, performance-based approach to fire protection requirements. The intent is to assess fire risk and safety significance for each plant area, and to implement fire protection commensurate with this assessment. The governing regulation, 10 CFR 50.48(c), was issued in 2004. Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," was issued in draft in 2004 and in final in 2006 to provide guidance for complying with 10 CFR 50.48(c). RG 1.205 is currently being revised.

The overall fire protection program integrates plant design and fire protection equipment with administrative controls, employee training, and fire watches to provide a defense in depth. There are following four regulatory documents upon which a risk-informed performance-based fire protection is based: 10 CFR 50.48(c), NFPA 805, NEI 04-02, and Regulatory Guide 1.205.

- The governing regulation is 10 CFR 50.48(c), “National Fire Protection Association Standard NFPA 805,” which endorses NFPA 805 with some exceptions and modifications (e.g., credit for the use of feed-and-bleed cooling is not permitted).
- NFPA 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants,” is a fairly extensive document. It covers the entire fire protection program in detail for all phases of plant operation, including not only normal operation but also shutdown, degraded conditions, and decommissioning. Thus, NFPA 805 establishes a comprehensive set of requirements for fire protection programs. Its primary focus is on technical issues.
- Both 10 CFR 50.48(c) and NFPA 805 are considered to be “requirements.” In contrast, NEI 04-02, “Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c),” as its title states, is intended to provide a framework for the regulatory processes for adopting NFPA as a new licensing basis, i.e., transitioning to a risk-informed, performance-based program. In addition, NEI 04-02 provides guidance on the use of analytical tools, etc.
- Finally, Regulatory Guide 1.205 endorses NEI 04-02, again with some exceptions and modifications. Thus, the majority of the detailed technical material is in the NFPA and NEI documents; the NRC- issued regulation and regulatory guide are primarily endorsements.

DISCUSSION

The Reliability and PRA Subcommittee has reviewed this matter during the meetings held on June 1, August 18, and November 13, 2009, as summarized below:

June 1, 2009 Subcommittee Meeting:

During the June 1, 2009 Subcommittee meeting, the staff explained proposed changes to RG 1.205 (DG-1218). This Guide endorses Revision 2 to NEI 04-02, “Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c),” and includes integrated lessons learned from observation visits, fire PRA reviews, and plant License Amendment Request (LAR) reviews. The guidance in the proposed new SRP Section 9.5.1.2 is consistent with the proposed changes to RG 1.205.

The EPRI representative stated that RG 1.205 requires the use of conservative methods from NUREG/CR-6850, “EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities,” and deviations from these methods will require prior NRC approvals. He further stated that outdated, prescriptive, and conservative methods should not be imposed on the licensees. Instead, the guidance provided in RG 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” should be considered appropriate.

August 18, 2009 Subcommittee Meeting:

During the August 18, 2009 meeting, the staff presented public feedback and comments on RG 1.205 and SRP 9.5.1.2, and staff’s resolutions of public comments. The staff discussed the

latest RG 1.205, Rev.1 positions to include that additional risk (Δ CDF; Δ LERF) of recovery actions (RA) must be evaluated and for the previously approved ones, the risk has to be acceptable to the AHJ unless it trips the backfit adequate protection or cost-beneficial backfit. The staff discussed using RG 1.174 to evaluate the additional risk from a previously-approved RA.

November 13, 2009 Subcommittee Meeting:

During the November 13, 2009 meeting, the staff stated that RG1.205, Rev. 1 had incorporated the comments made by the subcommittee members during the August 18, 2009 meetings. The subcommittee members have additional comments in this meeting. The comments are summarized below:

- In Section 2.2.4, Risk Evaluations, it is suggested to clarify why the performance-based approaches are adequate for fire areas previously evaluated using deterministic approaches.
- In Section 2.2.4.1, Figure 1 discussing Δ Risk (e.g., Δ CDF and Δ LERF), should the total risk (e.g., CDF and LERF) be also discussed?
- In Section 2.4, Recovery Actions, it is suggested to clarify the sentence “Other operator actions that may be credited in plant procedures.....but licensees do not need to evaluate the additional risk of their use.”
- In Section 3.3, Circuit Analysis, it is suggested to specify the specific chapter referenced in NEI 00-01, Rev. 1 for circuit failure analysis.

Two pilot plants (Oconee and Harris) also made presentations on the experience of NFPA 805 transition. Oconee station supports the approval of draft RG 1.205, rev.1 and Harris station discusses the perspective of RG 1.205, Rev. 1 changes and has no objections on the changes.

NEI representative discussed some of the concerns about the status of RG 1.205, rev.1 and suggested to revise RG 1.205 in the future when appropriate.

MAJOR CHANGES TO DRAFT REGULATORY GUIDE 1.205, REV.1

- A sample license condition is provided in Section 3.1 which includes acceptance criteria for making changes to the licensee’s FPP without prior NRC review and approval. The acceptance criteria are described in two categories: (a) risk-informed changes that may be made without prior NRC approval and (b) other changes that may be made without prior NRC approval
- In NFPA 805 plant change evaluation process, any risk increases may be combined with risk decreases when estimating the total risk change. Licensees should address combined changes in accordance with the guidance in Regulatory Positions 2.1.1 and 2.1.2 of Reg. Guide 1.174.

- For carryover of current fire protection programs into NFPA 805, elements of a licensee's current pre-transition fire protection licensing bases that can be shown to meet NFPA 805 requirements, including approved exemptions, deviations, and safety evaluation reports, are not "changes to a previously approved FPP" and would not be included in the NFPA 805, Section 2.4.4, plant change evaluation. However, certain recovery actions, whether or not part of the current fire protection licensing basis, require use of performance-based methods, as described in Regulatory Position 2.4.
- For recovery actions, NFPA 805, Section 4.2.3.1, identifies recovery actions for which the additional risk of operator actions must be evaluated. These "success path" recovery actions are operator actions that, if not successful, would lead to the fire-induced failure of the "one success path of required cables and equipment to achieve and maintain the nuclear safety performance criteria." Other operator actions that may be credited in plant procedures or the fire PRA to overcome a combination of fire-induced and random failures may also be recovery actions, but licensees do not need to evaluate for the additional risk of their use.
- For the fire probabilistic risk assessment, the licensee's self-approval process should include an evaluation of all unresolved peer review issues to assess the potential impact of the unresolved issue on the application specific evaluation. Any unresolved issue that could have a substantive impact on the results must be resolved. The licensee's self-approval process should also include the methods for modeling the cause and effect relationship.
- Recognizing that merely using the methods explicitly documented in NUREG/CR 6850/EPRI 1011989 may result in a conservative assessment of fire risk, licensees may choose to perform more detailed plant-specific analyses to provide greater realism in the fire PRA.
- Although a licensee may transition to an FPP based on NFPA 805 without a fire PRA model that encompasses all the areas in its facility, licensees must develop a plant-specific fire PRA of sufficient scope and technical adequacy to demonstrate that the risk-informed requirements in the rule are met for all areas where the risk-informed approach is used. If a fire PRA is only performed for areas where the risk-informed approach described in NFPA 805, Sections 2.4.3 and 4.2.4.2 is used, the licensee should develop, review, and maintain this limited –scope PRA in accordance with all applicable guidelines.. The acceptance guidelines of Regulatory Guide 1.174 may require the total CDF, LERF, or both to evaluate changes where the risk impact exceeds specific guidelines. If there are no areas that rely on the risk-informed approach, licensees may propose an alternative approach for transitioning to, and making changes to an FPP based on 10 CFR 50.48(c).
- Section 2.2.4, Risk Evaluations, under Section 2.0, License Transition Process, is a major rewrite as the result of the presentation of the August 18 subcommittee meeting. In accordance with 10 CFR 50.48(c), licensees may evaluate fire areas using performance-based approaches. The performance-based approaches may be fire modeling or other engineering analyses (i.e., NFPA 805, Section 4.2.4.1, a fire risk evaluation, NFPA 805, Section 4.2.4.2), or a risk-informed or performance-based

alternative in compliance with NFPA 805 (i.e., 10 CFR 50.48(c)(4)). These methods are applied to aspects of a fire area that are used as an alternative to the NFPA 805 deterministic criteria, whether these alternatives involve hardware (equipment and systems) functions or human actions. The fire risk evaluation (including recovery actions) is discussed in detail in Subsection 2.2.4.1. The flow chart presented in the August meeting was included in the Reg. Guide to facilitate the discussion. Total plant delta risk of implementing NFPA 805 is discussed in Subsection 2.2.4.2 and the baseline risk for plant change evaluations is discussed in Subsection 2.2.4.3.

- In Section 2.4, the staff has identified two cases where operator actions taken outside the main control room may be considered as taking place at a *primary control station*. These two cases involve dedicated shutdown or alternative shutdown controls, which have been reviewed and approved by the NRC. In either case, the location or locations become primary when command and control is shifted from the main control room to these other locations. For these two cases, the operator actions are not considered recovery actions, even if they are necessary to achieve the nuclear safety performance criteria. Activities to achieve the nuclear safety performance criteria that take place outside the main control room and are not covered by one of these two cases should be considered recovery actions as defined in NFPA 805.

EXPECTED FULL COMMITTEE ACTION

During the upcoming 568th ACRS meeting on December 3, 2009, the Committee will be expected to review Revision 1 to Regulatory Guide 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants" and the accompanying Draft Final Standard Review Plan (SRP) Section 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection Program." The Committee will also hear recommendations from the Reliability and PRA Subcommittee for its consideration. After reviewing this matter, the Committee may consider providing a report on this matter.

REFERENCES

1. Draft Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, October 2009.
2. Draft Standard Review Plan, 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection Program" Rev. 0, January 2009.
3. NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition.
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