

Risk-Informed, Performance-Based Fire Protection Implementation (NFPA 805)

The staff worked with the National Fire Protection Association (NFPA) to develop a consensus standard, NFPA 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants,” 2001 Edition. In June 2004, NFPA 805 was incorporated by reference in 10 CFR 50.48(c) and published in the Federal Register (69 FR 33536). This Risk-Informed (RI) rule is a voluntary alternative to the existing deterministic fire protection requirements of 10 CFR 50.48(b).

In conjunction with the NFPA 805 rule, the Nuclear Energy Institute (NEI) developed an implementation guide, NEI 04-02, “*Guidance for Implementation a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c).*” In May 2006, NRC issued Regulatory Guide (RG) 1.205, “*Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants*” endorsing Revision 1 of NEI 04-02. NEI 04-02 was again revised (Revision 2) in April 2008 and the staff endorsed the revision in RG 1.205, Rev. 1, December 2009. 51 operating nuclear power plant units sent the NRC a letter of intent to adopt NFPA 805 as their licensing basis; however three units have withdrawn their letter of intent.

In 2005, the NRC chose two sites; Oconee and Shearon Harris to pilot their transition to the NFPA 805. From 2005 to 2008, observation visits were conducted with the pilot plants to document the progress and address any implementation issues. Trip reports documented the lessons learned from these visits.

In 2006, a Frequently Asked Question (FAQ) process was developed to review and establish a preliminary staff position on implementation issues identified during, or in parallel with the pilot plant reviews (RIS 2007-19). To date, the staff continues to hold monthly public meetings with the NEI NFPA 805 Task Force to address FAQs as they are identified and to status the current NFPA 805 reviews. Resolution of FAQs are documented in publicly available memos, and then incorporated into the next NEI 04-02 revision, which the NRC would endorse in a revision to RG 1.205, or other reference document (e.g., NEI 00-01, NUREG/CR-6850, etc.).

In 2008, the pilot plants submitted license amendment requests (LARs), per 10 CFR 50.90, to transition their 10 CFR 50.48(b) fire protection program to a risk-informed 10 CFR 50.48(c) program. The LARs were 600 to 800 pages in length and had thousands of background calculations maintained at the site. Regulatory audits and clarification visits and calls were held to review these LARs and site calculations. NRC licensed facility set-up SharePoint Portals, so the staff could review these on-site calculations more efficiently. The staff asked numerous RAIs (requests for additional information) and the site supplied additional supplemental information to be reviewed and placed on the public docket. The staff also conducted Fire Probabilistic Risk Assessment (PRA) reviews to assure adequate quality and completeness for these applications. Subsequent plants are conducting independent industry peer reviews per industry standards, as endorsed by RG 1.200, and the staff is utilizing these peer reviews as part of the staff evaluations of the PRA quality. The Shearon Harris and Oconee NFPA 805 applications to transition to NFPA 805 were approved in 2010.

The staff is currently reviewing 6 non-pilot NFPA 805 LARs; and expects two LARs by the end of CY-2017. One LAR is expected by the end of CY-2018.

The Office of Research continues to work with the Electric Power Research Institute (EPRI) to develop essential documents for the successful implementation of the NFPA 805 rule. The first document was NUREG/CR-6850, “*Fire PRA Methodology for Nuclear Power Facilities*,” September

2005 and the second was NUREG-1824, "Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications," May 2007. Credible Fire PRAs and Fire Models help ensure the application of risk is appropriate for the NRC's fire protection regulation. Collaboration with EPRI brought together nationally recognized technical experts to document the state-of-the-art in Fire PRA methodology and verify and validate fire models.

The staff developed a Standard Review Plan (SRP) 9.5.1.2 to review the risk-informed fire protection LARs for plants transitioning to NFPA 805. This SRP builds off lessons learned from the pilot plant reviews, NEI 04-02, FAQs, and RG 1.205.

It has also been recognized that, for the near-term, fire PRA methods are being further refined and will evolve as they are used. To ensure new methods are acceptable, the industry has established a Fire PRA Methods Task Force to review these refinements or new methods. In parallel, NRR is taking the lead to interact with the industry task force.

Web-site: <http://www.nrc.gov/reactors/operating/ops-experience/fire-protection.html>

Project Considerations: Lack of industry Fire PRA expertise has slowed the transition process as the limited expertise impacts the ability of licensees to develop the fire PRAs as well as impacting the availability of the experts to perform the related industry peer reviews.

Issues with new fire PRA analysis methods that are being submitted during the LAR is slowing the review process.

Completed Milestones

- DC Cook: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Duane Arnold: Accepted LAR, Conducted Site Audit, Sent RAIs, Issued SE
- Callaway: Accepted LAR, Conducted Site Audit, Sent RAIs, Issued SE
- Kewaunee: Withdrew from NFPA-805 transition due to permanent plant shutdown
- Ft. Calhoun: Accepted LAR, Conducted Site Audit, Sent RAIs, Issued SE
- Waterford: Accepted LAR, Conducted Site Audit, Sent RAIs; Accepted Licensee Re-submittal of LAR; Conducted Site Audit, Sent RAIs, Issued SE
- VC Summer: Accepted LAR, Conducted Site Audit, Sent RAIs, Issued SE
- ANO-2: Non-Accepted LAR for Review; LAR Re-submittal Accepted, Conducted Site Audit, Sent RAIs, Issued SE
- Cooper: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Nine Mile Point: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Turkey Point: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Prairie Island: Withdrew LAR, LAR Re-submittal accepted, Conducted Site Audit, Sent RAIs, Preparing SE
- Farley: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Brunswick: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Palisades: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Browns Ferry: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- St. Lucie: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- San Onofre: Withdrew from NFPA-805 transition due to permanent plant shutdown
- Ginna: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Point Beach: Accepted LAR for review, Conducted Site Audit, Sent RAIs, Issued SE
- Diablo Canyon: Accepted LAR for review, Conducted Site, Audit, Sent RAIs, Issued SE
- McGuire: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Preparing SE

- Robinson: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Preparing SE
- Catawba: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Preparing SE
- Calvert Cliffs: Accepted LAR for Review, Conducted Site Audit, Sent RAIs, Issued SE
- Beaver Valley: Accepted LAR for Review, Conducted Site Audit, Sent RAIs
- ANO-1: Accepted LAR for Review, Conducted Site Audit Sent RAIs, Issued SE
- Davis Besse: Accepted LAR for review, Conducted Site Audit, Sent RAIs, Preparing SE
- Hatch: LAR to be Submitted April 4, 2018

NOTE: Monticello, Nine Mile Point 2, Kewaunee, Crystal River 3, and San Onofre 2&3 withdrew their commitments to transition.

Selected Major Milestones and Schedules				
Major Milestones	Target Date	Revised Date	SE Completion Date	NRC Responsibility
• Disposition DC Cook LAR	June 2013	Dec 2013	Oct 2013	NRR/DRA NRR/DORL
• Disposition Duane Arnold LAR	Aug 2013	Feb 2014	Sept 2013	NRR/DRA NRR/DORL
• Disposition Callaway LAR	Sept 2013	Mar 2014	Jan 2014	NRR/DRA NRR/DORL
• Disposition Ft. Calhoun LAR	Oct 2013	Apr 2014	June 2014	NRR/DRA NRR/DORL
• Disposition Waterford LAR	Dec 2013	Jan 2016	June 2016	NRR/DRA NRR/DORL
• Disposition VC Summer LAR	May 2014		Feb 2015	NRR/DRA NRR/DORL
• Disposition Cooper LAR	June 2014		April 2014	NRR/DRA NRR/DORL
• Disposition Nine Mile Point LAR	July 2014		June 2014	NRR/DRA NRR/DORL
• Disposition ANO-2 LAR	Dec 2014		Feb 2015	NRR/DRA NRR/DORL
• Disposition Turkey Point LAR	Apr 2014	Nov 2014	May 2015	NRR/DRA NRR/DORL
• Disposition Prairie Island	Dec 2014	Dec 2016		NRR/DRA NRR/DORL
• Disposition Farley LAR	Sep 2014	Jan 2015	Mar 2015	NRR/DRA NRR/DORL
• Disposition Brunswick LAR	Sep 2014	Nov 2014	Jan 2015	NRR/DRA NRR/DORL
• Disposition Palisades LAR	Dec 2014		Feb 2015	NRR/DRA NRR/DORL
• Disposition Browns Ferry LAR	Dec 2014	Oct 2015	Oct 2015	NRR/DRA NRR/DORL
• Disposition St. Lucie LAR	Mar 2014	Nov 2015	Mar 2016	NRR/DRA NRR/DORL
• Disposition Ginna LAR	Mar 2014	Nov 2015	Nov 2015	NRR/DRA NRR/DORL
• Disposition Point Beach LAR	Jun 2014	Nov 2015	Sep 2016	NRR/DRA NRR/DORL

• Disposition Diablo Canyon LAR	Jun 2014	Jun 2016	Apr 2016	NRR/DRA NRR/DORL
• Disposition Robinson LAR	Sept 2015	Dec 2016		NRR/DRA NRR/DORL
• Disposition Calvert Cliffs LAR	Sept 2015	Dec 2015	Aug 2016	NRR/DRA NRR/DORL
• Disposition McGuire LAR	Sept 2015	Oct 2016		NRR/DRA NRR/DORL
• Disposition Catawba LAR	Sept 2015	Oct 2016		NRR/DRA NRR/DORL
• Disposition Beaver Valley LAR	Sept 2015	Dec 2016		NRR/DRA NRR/DORL
• Disposition ANO1 LAR	Nov 2015	Jan 2016	Oct 2016	NRR/DRA NRR/DORL
• Disposition Davis Besse LAR	Dec 2017			NRR/DRA NRR/DORL
• Disposition Hatch LAR	Apr 2020			NRR/DRA NRR/DORL

*Exclusionary Memos have been published for the following plants currently under review:
Waterford, Prairie Island, Browns Ferry, St. Lucie, Ginna, Robinson, McGuire, and Catawba.