

# NRC Liaison Report Risk-Informed Activities

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American Society of Mechanical  
Engineers/American Nuclear Society  
(ASME/ANS) Joint Committee on Nuclear  
Risk Management (JCNRM) Meeting

February 14, 2019

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# Overview

- NRC Risk-Informed Activities Update
- ASME/ANS PRA Standards
- Regulatory Guide 1.200
- Industry Guidance

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# 10 CFR 50.69

- Adoption of 10 CFR 50.69 focuses NRC and licensee attention on safety significant activities
- NRC has resources available for 10 reviews/year for completion within 12 months of submission
- NRC has 10 LARs in house and three additional near-term submittals are expected
- NRC has recently accepted 50.69 LARs on a 15-month review schedule due to resource limitations and receiving more LARs than originally anticipated and/or with the inclusion of external events models
- To date, 20 LARs submitted; 16 accepted for NRC review; several audits conducted, more audits planned
- Industry anticipates most plants will submit LARs in the next several years
- Potential obstacles for of reviews
  - LARs that follow industry template and have acceptable PRAs require less time and resources for NRC review
  - These LARs are the first wide scope use of NUREG-1855 and specific, acceptable dispositions to identify non-key-assumptions need to be developed

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# Risk-Managed Technical Specifications

- Risk insights can provide basis for modifying various aspects of TS
  - Fixed extensions (e.g., extending TS completion times from 3 to 7 days)
  - TSTF-505: risk-informed extended TS completion times program (RITSTF Initiative 4b)
  - TSTF-425: risk-informed surveillance frequencies program (RITSTF Initiative 5b)
- NRC anticipates an increased number of TSTF-505 LARs
  - Suspension on use of TSTF-505 lifted in late-2018 with issuance of NRC's final model safety evaluation approving TSTF-505, Revision 2 (ML18253A085)
- NRC continues to review implementation of the TSTF-425 surveillance frequency control program
  - Adopted by ~75% of industry
  - Inspection Procedure 71111.22, Surveillance Testing – Appendix A

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# Newly Developed PRA Methods

- NRC staff participated in three small PWROG workshops from late-2018 to early-2019
- Workshops have been successful and efficient in addressing issues
- Developed definitions of terms including a formal definition for the term *newly developed method*
- Developed criteria for peer review of a newly developed PRA method
- The peer review criteria for a newly developed PRA method are requirements that belong in the PRA standard, not in a guidance document
- Process for NRC to accept newly developed methods for use in risk-informed changes to the licensing basis is under development

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# Fire PRA Realism

- Industry expressed that improvements in fire PRA realism are necessary to support risk-informed regulatory applications
- NRC is supporting efforts to look for additional ways to improve the realism of fire PRA
- NRC and NEI continue to hold meetings to decide on the path forward for unresolved fire PRA FAQs
  - Evaluation of suitability for incorporating some FAQs into existing research program
- NRC continues to work with EPRI on a spectrum of projects in fire PRA under the joint MOU

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# Crediting Mitigating Strategies in RIDM

- Licensees have requested credit for FLEX strategies in a number of areas beyond compliance with beyond design basis external events (e.g. SDP, LARs, NOEDs)
- Inclusion of FLEX into current risk-informed applications is inconsistent and unclear
  - LARs may not mention that FLEX has been included leading to generic RAIs
  - FLEX is being included contrary to the NRC guidance (e.g., use of current generic failure data)
- Several challenges exist requiring NRC and industry RISC engagement
- Numerous current activities to enable licensees to appropriately credit FLEX
- Expert Elicitation regarding HRA for FLEX equipment (May 2018)
  - Draft report under development by NRR\RES on HRA for using FLEX to be made publicly available (1<sup>st</sup> Quarter 2019)
- Industry efforts:
  - Industry is sharing FLEX operational experience with NRC staff
  - To provide schedule for any industry guidance relating to HRA method development.

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# Tornado Missile Risk Evaluator

- Develop and demonstrate implementation of a risk-informed tornado missile protection evaluation model for licensees with non-conforming legacy design structures, systems, and components
- NEI 17-02, Revision 1, drafted for use by pilot plants
- Three pilot LARs have been submitted to NRC
  - Staff issued safety evaluation for the first pilot application (ML18304A394)
  - Post-pilot amendments could model pilot safety evaluations
  - NRC reviews of the other pilots are in progress



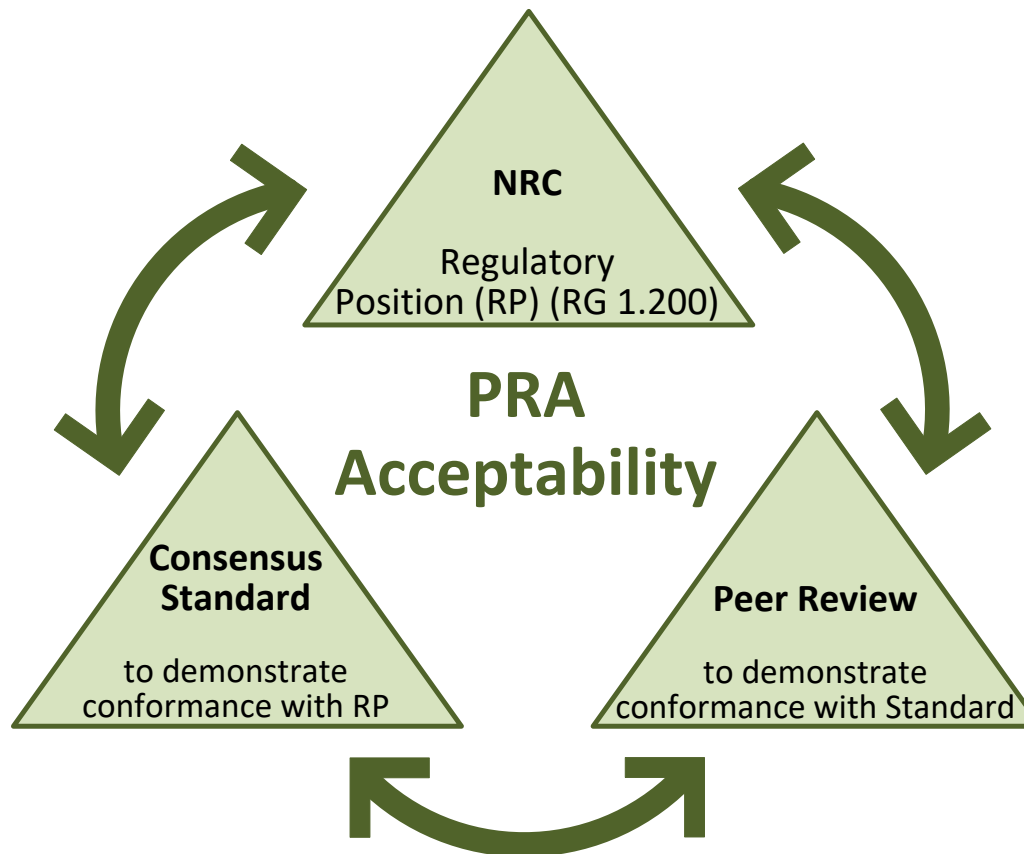
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# Realism in ROP

- Industry has expressed concerns about realism in the ROP and informed NRC that addressing their concerns relating to CCF is the highest priority
- Staff began review of the industry whitepaper on CCF (Revised whitepaper transmitted to NRC on January 12, 2018)
- NRC staff and management held public meeting to discuss (December 2018) NEI's CCF white paper
- NRC announced two-pronged approach during public meeting:
  - NRC will release memo announcing a 1-year trial basis where licensees can submit info about “defense strategies” that might justify reducing CCF contribution to specific SDP findings
  - Burden is on licensees to demonstrate why these “defense strategies” are not already “baked into” the existing alpha factors
  - NRR and RES to explore viability of partial/causal alpha factor method

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# PRA Acceptability



All three elements must work together

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# New Edition of the ASME/ANS PRA Standard

## (1 of 2)

- NRC considers it essential that the new edition of the Level 1 PRA standard be thoroughly reviewed
- Beyond consistency and technical correctness, the Level 1 PRA standard must work correctly across the various parts
- Key issues to be resolved in new edition of the Level 1 PRA standard:
  - Definitions and implementation of risk-significance
  - PRA Screening Criteria
  - Table of hazards
  - Criteria for peer review of a newly developed method
  - PRA maintenance versus PRA upgrade
- NRC is participating in industry workshops to expeditiously resolve issues
- Public meetings to be held communicating status of issues

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# New Edition of the ASME/ANS PRA Standard

## (2 of 2)

- Timeliness of the new edition of the Level 1 PRA standard and other PRA standards is becoming very important
- A stable version of the new edition of the Level 1 PRA standard is needed as soon as possible to support:
  - numerous ongoing and increasing numbers of risk-informed activities for operating reactors
  - the continued development and timely completion of multiple other standards.
- It is also critical to maintain the quality of the new edition of the Level 1 PRA standard.
- NRC issued a letter to the ASME and ANS Standards Boards (ML19031C904) describing the importance and priority of the PRA standards

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# Non-LWR and Advanced LWR Activities (1 of 2)

- Continued progress on the ALWR and NLWR PRA standards is reliant on a stable version of new edition of the Level 1 PRA standard
- Proper vetting of the NLWR PRA standard is very important
  - For example, a thorough comparison needs to be made between the NLWR PRA standard and the LWR standards
- The Nuclear Energy Innovation and Modernization Act recently became law on 1/14/2019 (Law No. 115-439)
  - Section 103 specifically addresses advanced nuclear reactors
  - Accelerates schedules for the expected use of the ALWR and NLWR PRA standards
- PRA standards need to be ready for potential applications
- Guidance on NLWR PRA peer review is needed, which could be developed by JCNRM or industry.
  - A peer review could be performed to CC I or CC II depending on the application
  - The peer review team will need to understand the scope of the application and review the PRA accordingly

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## Non-LWR and Advanced LWR Activities (2 of 2)

- NRC is developing an action plan for the review and endorsement of the NLWR PRA standard
- NRC endorsement of the NLWR PRA standard is expected to be provided in a new regulatory guide separate from RG 1.200
- Endorsement of the NLWR PRA standard is expected to be different and more complicated than in RG 1.200.
  - NRC will need to provide endorsement on CC I *and* CC II
- Endorsement of the ALWR PRA standard is expected to be provided in RG 1.200, Revision 4

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# Regulatory Guide 1.200

- RG 1.200, Revision 3
  - Draft guide tentatively scheduled for public review and comment late-2019 to early-2020 (dependent on schedule for the new edition)
  - Final RG with staff endorsement tentatively scheduled for late-2020/early-2021
  - Expected to endorse New Edition of Level 1 and the Level 2 PRA standards and NEI 17-07
- RG 1.200, Revision 4
  - Expected to endorse appendix to New Edition of the Level 1 PRA standard on advanced LWRs for design certification
- Interim NRC approval letters issued for:
  - NEI Appendix X to NEI 05-04, NEI 07-12, and NEI 12-13
  - Part 5 Code Case
  - NEI 12-13

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# NEI 17-07

- NRC staff provided comments to NEI on NEI 17-07 in December 2018.
- NEI is piloting peer review of newly developed methods using NEI 17-07 in spring/summer 2019
- NRC's understanding is that NEI 17-07 will subsequently be updated based on lessons learned from the pilots and NRC comments
- NRC plans to issue interim approval letter for NEI 17-07 in the near-term and provide endorsement in RG 1.200, Revision 3



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# Acronyms

ALWR	advanced light-water reactor	NEI	Nuclear Energy Institute
ANS	American Nuclear Society	NFPA	National Fire Protection Association
ASME	American Society of Mechanical Engineers	NLWR	non-light-water reactor
CC	Capability Category	NOED	Notice of Enforcement Discretion
CCF	common-cause failure	NRC	U.S. Nuclear Regulatory Commission
CDF	core damage frequency	NRR	Office of Nuclear Reactor Regulation
CFR	<i>Code of Federal Regulations</i>	PRA	probabilistic risk assessment
CT	completion time	PWROG	Pressurized-Water Reactor Owners Group
EPRI	Electric Power Research Institute	RES	Office of Nuclear Regulatory Research
FAQ	Frequency Asked Question	RG	Regulatory Guide
HRA	Human Reliability Analysis	RISC	Risk-Informed Steering Committee
JCNRM	Joint Committee on Nuclear Risk Management	RITSTF	Risk-Informed TSTF
LAR	license amendment request	ROP	Reactor Oversight Process
LERF	large early release frequency	SDP	Significance Determination Process
LPSD	low power and shutdown	SERP	Significance and Enforcement Review Panel
MOU	memorandum of understanding	TS	technical specification
		TSTF	Technical Specification Task Force