U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Advanced Reactor Stakeholder Public Meeting

September 18, 2024

Microsoft Teams Meeting
Bridge line: 301-576-2978
Conference ID: 425 132 082#

Time	Agenda	Speaker
9:50 - 10:00 am	*Advanced Reactor Ready Slides*	
10:00 - 10:15am	Opening Remarks	NRC
10:15 - 10:35 am	Safety Evaluation Template Development Initiative for the LMP-Based Applications	NRC
10:35 – 11:00 am	Alternative Risk-Informed, Technology-Inclusive Approaches to Advanced Reactor Regulation SECY Paper	NRC
11:00-11:10 am	Announce newly issued proposed rule for power reactor security	NRC
11:10-11:30	Present NEI 24-05: Risk-informed Performance-based Emergency Planning	ANL
	LUNCH	
1:00 - 1:30 pm	ADVANCE Act Report to Congress involving Nuclear Reactor Application Environmental Reviews	NRC
1:30 – 1: 45 pm	ADVANCE Act Advanced Reactor Topics	NRC

Time	Agenda	Speaker
1:45– 2: 00 pm	NEI draft technical report on Fire Brigade Staffing	NEI
2:00– 2: 15 pm	Update on NEI 22-04/ISO-9001 and AR Codes and Standards	NEI
2:15 - 2:30 pm	Public Comment Period	NRC
2:30 – 2:35 pm	Closing Remarks	NRC

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Opening Remarks

Advanced Reactor Program

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Advanced Reactor Program Recent Highlights

Advanced Reactor Program Highlights (Continued)

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- ***The revised Part 53 proposed rulemaking package was transmitted to the Commission on September 4, 2024, for their review before publication in the Federal Register, in accordance with Commission direction in SRM-SECY-23-0021.***
- ***On Monday, September 16, the Office of Nuclear Reactor Regulation (NRR) issued a construction permit (CP) and associated safety evaluation (SE) to Abilene Christian University (ACU) for its Molten Salt Research Reactor (MSRR) to be located on its campus in Abilene, Texas. The CP and SE were issued ahead of the September 30, 2024, public milestone and were completed within the published resource estimate.***

Highlights (continued)

- September 25, 2024 –**2024 NRC Standards Forum**
  - This will be a hybrid meeting:
  - In-person at the TWFN Auditorium
  - Online via MS Teams
  - The meeting notice and registration page are available:
  - **Meeting Notice** (https://www.nrc.gov/pmns/mtg?do=details&Code=20240927)
  - **Registration Page** (https://events.gcc.teams.microsoft.com/event/3da8da0e-f4ed-4ec0-92e8-1a8e75daffcb@e8d01475-c3b5-436a-a065-5def4c64f52e)

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Development of Advanced Reactor Safety Evaluation Templates

Ian Jung
NRR/DANU

Introduction

- NRC is implementing strategies to improve the effectiveness and efficiency of its licensing reviews while maintaining its safety focus.

- The use of templates to standardize and streamline the safety evaluation (SE) writing process is essential to managing an increasing workload.

Background

- SE templates can be used for the review of new and advanced reactor applications and topical reports
- Initiatives on the more safety-focused reviews led to new or revised SE templates and associated staff guidance
  - Consistent, clear, complete, and concise SEs support our principles of efficiency, openness, and reliability
  - Based on lessons learned from past reviews, SE structure reflects scope and depth of review, commensurate with the risk or safety significance of the issues

ARCAP/TICAP

- ARCAP/TICAP provides guidance on content of application for the LMP-based applications
  - RG 1.233/NEI 18-04 and RG 1.253/NEI 21-07 ("…inform the licensing basis and content of applications…)
  - ARCAP Interim staff guidance (ISG) documents developed to cover the remaining portions of the content of applications not addressed by the LMP.
- Chapters (1-12) and associated contents are very different from those of NUREG-0800.

ARCAP Chapters

- Chapter 1 – General Plant Information, Site Description, and Overview of the Safety Analysis
- Chapter 2 – Methodologies, Analyses, and Site Evaluations
- Chapter 3 – Licensing Basis Events
- Chapter 4 – Integrated Evaluations
- Chapter 5 – Safety Functions, Design Criteria, and SSC Categorization
- Chapter 6 – Safety-Related SSC Criteria and Capabilities
- Chapter 7 – Non-Safety-Related with Special Treatment (NSRST) SSC Criteria and Capabilities
- Chapter 8 – Plant Programs
- Chapter 9 – Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste
- Chapter 10 – Control of Occupational Dose
- Chapter 11 – Organization and Human-Systems Considerations
- Chapter 12 – Post Construction Inspection, Testing, and Analysis Program.

Template Structure Example

3.1 Probabilistic Risk Assessment

3.1.1 Introduction

[Briefly describe the primary subject (e.g., system, function, program, and plan) for the Chapter.

The staff can usually find this information in the application such as Preliminary Safety Analysis Report (PSAR) or Final Safety Analysis Report (FSAR). The description should be purposely concise and provide the reader with a basic understanding of the subject. It should point to the application section for details to minimize unnecessary duplication.]

Section 3.1 of the Kemmerer 1 PSAR summarizes the probabilistic risk assessment (PRA) used as the primary tool for implementing the risk-informed and performance-based Licensing Modernization Project (LMP) methodology in NEI 18-04, Revision 1, as endorsed in RG 1.233, Revision 0, which includes identifying licensing basis events (LBEs), determining the classification of structures, systems and components (SSCs) and their special treatments, and evaluating defense-in-depth (DID) adequacy. *Review of Section 3.1 for a CP application should acknowledge the potentially preliminary nature of the design and PRA.*

3.1.2 Regulatory Evaluation

3.1.3 Technical Evaluation

3.1.4 Conclusion

3.1.5 References

- Template contains pre-populated languages, partly based on application content, and guidance for the staff use.

Status

- Begin with CP SE template for nearest-term license applications
  - Generic templates, based on the LMP, under development
    - Key LMP Chapters (e.g., Chapters 2-5) developed early
  - SE template for the Natrium Kemmerer 1 CP application complete and is being used
  - SE template for the Xe-100 Project Long Mott CP application under development
    - Preliminary draft complete and to be updated when CP application is submitted

Path forward

- Complete Kemmerer 1 CP SE using template
- Finalize SE template for Xe-100 Project Long Mott CP application
- Create generic SE template for CP applications reflecting experience from Kemmerer 1 and Project Long Mott
- Create SE templates for future OL/COL applications using principles of CP SE template
- Continue refinement as needed

Summary

- The LMP has introduced a new licensing framework for applications and SE templates are being developed consistent with the ARCAP/TICAP guidance and LMP structure.
- The use of templates to standardize and streamline SE writing is an essential strategy to manage an increased licensing workload.
- Staff are developing and using initial templates for CP SEs for Kemmerer 1 and Project Long Mott.
- Staff will continue to refine the templates and expand their use to additional application types, such as OLs and COLs.

Acronym

- ARCAP Advanced Reactor Content of Application Project
- COL combined license
- CP construction permit
- DID defense-in-depth
- LBE licensing basis event
- LMP Licensing Modernization Project
- NEI Nuclear Energy Institute
- NRC U.S. Nuclear Regulatory Commission
- NSRST non-safety-related with special treatment
- OL operating license
- PRA probabilistic risk assessment
- PSAR preliminary safety analysis report
- RG Regulatory Guide
- SE safety evaluation
- SSC structure, system, and component
- TICAP Technology Inclusive Content of Application Project

Alternative Risk-Informed, Technology-Inclusive Approaches to Advanced Reactor Regulation

Advanced Reactor Stakeholders Meeting

September 18, 2024

Rebecca Ober, Advanced Reactor Policy Branch
Angelica Gheen, Advanced Reactor Policy Branch
U.S. Nuclear Regulatory Commission

https://www.nrc.gov/reactors/new-reactors/advanced.html

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Contents

- Goals of this presentation
- Background
- Proposed Options
- Attributes
- Next steps

Goals of this Presentation

- Seek stakeholder perspectives and input on alternative approaches to risk-informed, technology-inclusive approaches to advanced reactor regulation.

Background

- In 2019, the Nuclear Energy Innovation and Modernization Act (NEIMA) was signed into law which required the NRC to prepare the regulatory infrastructure to support the development and commercialization of advanced nuclear reactors.
- In response, the staff delivered to the Commission in March 2023 a draft proposed rule known as "Part 53" for advanced reactor regulation. The draft proposed rule consisted of two distinct frameworks, known as Framework A and Framework B.
- The approach in Framework A highlights the role of PRA in risk-informed and performance-based approaches to identifying enhanced safety margins that can be used to justify operational flexibilities.

Background

- During initial development of Part 53, stakeholders indicated that some designers might find the use of PRA unduly restrictive. To address this feedback, the NRC developed an alternate approach to licensing in part 53, which became Framework B in the draft proposed rule.
- Framework B largely replicates the existing licensing approach in parts 50 and 52 but modifies it to be technology-inclusive.
- In addition, Framework B would require applicants to use risk insights from a PRA, or an alternative evaluation for risk insights (AERI), in a confirmatory role to support a largely deterministic safety analysis.

Background

- Staff delivered the draft proposed rule to the Commission in SECY-23-0021[1].
- In the resulting SRM[2], the Commission disapproved the inclusion of the proposed Framework B in Part 53 and directed staff to develop a notation vote paper for Commission consideration that proposes options for the use of Framework B outside of the Part 53 rulemaking.

[1]SECY-23-0021, "Proposed Rule: Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors," dated March 1, 2023 (ML21162A095).

[2]SRM-SECY-23-0021, "Proposed Rule: Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors," dated March 4, 2024 (ML24064A047)

Potential Alternative Approaches

1. Update 10 CFR Parts 50 and 52 to include technology-inclusive provisions for advanced reactors.
2. Use a separate part in 10 CFR for Framework B.
3. Create a less prescriptive regulation where methods of compliance similar to Framework B could be located in guidance.
4. No action.

Criteria for Evaluating Approaches

- In order to ensure each approach is appropriately developed and evaluated, staff is using the Principles of Good Regulation (Efficiency, Openness, Clarity, Reliability, and Independence) to determine applicable attributes.
- These attributes will be used to evaluate the advantages and disadvantages of each approach and help shape staff's recommendation to the Commission.

Applicable Attribute Examples

- Efficiency
  - Potential costs for both NRC and Stakeholders
  - Timeframe for Completion
- Openness
  - Stakeholder Engagement
- Clarity
  - Predictability and Consistency of Reviews
  - Enhancing the ability to implement a flexible approach
- Reliability
  - Able to account for future changes in technology
- Independence
  - Supports unbiased assessments of all information during decision-making process

Next Steps

- Identify additional opportunities for stakeholder engagement, as needed.
- Publish a draft white paper, expected in late 2024, to support more detailed discussion.
- Develop a Commission paper on alternative technology-inclusive, risk-informed approaches for advanced reactors where risk analyses are used in a supporting or complementary role

Discussion Items

- What licensing needs should an alternative framework address that cannot be met by either the existing Parts 50 and 52 frameworks or the proposed Part 53 framework??
- Are there other attributes that the NRC staff should consider when evaluating the potential alternatives?
- Other feedback or questions for the NRC staff?

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Draft Proposed Rule

10 CFR Parts 50, 52, and 73
Alternative Physical Security Requirements for Advanced Reactors

August 9, 2024

Dennis Andrukat
U.S. Nuclear Regulatory Commission
Rulemaking Project Manager
NMSS/REFS/RRPB

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Meeting Specifics

- Notify stakeholders of the date and time of public meeting for the proposed rule
  - September 19th from 1 PM – 4 PM
- Provide information to help stakeholders prepare comments on the "Alternative Physical Security Requirements for Advanced Reactors" proposed rule and draft regulatory guidance

Background and Status

- The NRC decided to pursue this rulemaking due to the emergence of new reactor designs, which may warrant different methods for meeting the NRC's physical security requirements.
- The NRC conducted extensive public outreach including soliciting comments on a regulatory basis document and hosting public meetings on the preliminary proposed rule language.
- The proposed rule was published in the *Federal Register* on August 9, 2024 (89 FR 65226). The 75-day comment period ends October 23, 2024.

Proposed Rule and Related Documents

- **Proposed Rule**
  - Citation: 89 FR 65226 (August 9, 2024)
  - Web version (ML24178A370)
- **Supporting & Related Material**
  - Draft Regulatory Analysis (ML24178A372)
  - Draft Environmental Assessment (ML24178A374)
  - Draft Supporting Statements for Information Collections (ML21334A009; ML22131A161; ML22131A167)

Guidance Documents

- DG-5072 / RG 5.90, Rev 0 (ML20041E037)
  - "Guidance for Alternative Physical Security Requirements for Small Modular Reactors and Non-Light-Water Reactors"
  - Early version posted by NRC for awareness on 02-05-24
- DG-5071 / RG 5.81, Rev 2 (ML22021B529) (**Official Use Only**)
  - ‘‘Target Set Identification and Development for Nuclear Power Reactors"
  - Withheld from public disclosure and can be made available upon request to those members of the public with a need to know.

Proposed Rule Language

FOCUS AREAS:

- **73.55(b)(3)** – Added requirements specific to small modular reactors (SMRs) and non-light-water reactors (non-LWRs)
- **73.55(s)** – Alternative physical security requirements
  - **73.55(s)(1)** – General requirements
  - **73.55(s)(2)** – Specific alternative physical security requirements

Tips for Preparing Comments

How to submit a comment

- **Regulations.gov:** Comment Form

or

- **Email:** Rulemaking.Comments@nrc.gov

or

- **Mail:** Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001
  Attn: Rulemakings and Adjudications Staff

Applies to all public comments on the proposed rule and DG-5072 *(comments on DG-5071 follow a separate process, contact Lou Cubellis for more information)*

12254 Federal Register / Vol. 87, No. 42 / Thursday, March 3, 2022 / Proposed Rules

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 20, 26, 50, 51, 52, 72, 73, 140

[NRC–2015–0070]

RIN 3150–AJ59

Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations that relate to the decommissioning of production and utilization facilities. The NRC's goals in amending these regulations are to maintain a safe, effective, and efficient decommissioning process; reduce the need for license amendment requests and exemptions from existing regulations; address other decommissioning issues deemed relevant by the NRC; and support the NRC's Principles of Good Regulation, including openness, clarity, and reliability. The NRC will hold a public meeting to promote full understanding of this proposed rule and to facilitate public comments.

DATES: Submit comments by May 17, 2022. Comments received after this date will be considered if it is practical to do so, but the Commission is able to ensure consideration only for comments received before this date.

ADDRESSES: You may submit comments by the following method (unless this document describes a different method for submitting comments on a specific subject); however, the NRC encourages electronic comment submission through the Federal rulemaking website:

- *Federal Rulemaking Website:* Go to *https://www.regulations.gov* and search for Docket ID NRC–2015–0070. Address questions about NRC dockets to Dawn Forder; telephone: 301–415–3407; email: *Dawn.Forder@nrc.gov*. For technical questions contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.
- *Email comments to: Rulemaking.Comments@nrc.gov.* If you do not receive an automatic email reply confirming receipt, then contact us at 301–415–1677.
- *Mail comments to:* Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001, ATTN: Rulemakings and Adjudications Staff.

For additional direction on obtaining information and submitting comments, see "Obtaining Information and Submitting Comments" in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: Daniel I. Doyle, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; telephone: 301–415–3748; email: *Daniel.Doyle@nrc.gov*.

SUPPLEMENTARY INFORMATION:

Executive Summary

A. Need for the Regulatory Action

The NRC is proposing to amend its regulations related to the decommissioning of production and utilization facilities. The Commission directed the NRC staff to proceed with an integrated rulemaking on nuclear power reactor decommissioning to address the following: A graded approach to emergency preparedness (EP), lessons learned from the licensees that have already gone through (or are currently going through) the decommissioning process, the advisability of requiring a licensee's post-shutdown decommissioning activities report (PSDAR) to be approved by the NRC, the appropriateness of maintaining the three existing options for decommissioning and the timeframes associated with those options, the appropriate role of State and local governments and non-governmental stakeholders in the decommissioning process, and any other issues deemed relevant by the NRC staff.

Compared to an operating nuclear power reactor, the risk of an offsite radiological release is significantly lower, and the types of possible accidents are significantly fewer, at a nuclear power reactor that has permanently ceased operations and removed fuel from the reactor vessel. As a direct result, there is no need for the NRC to impose new requirements in the areas identified in this rulemaking to address safety or security concerns. Instead, the requirements in decommissioning should be aligned with the reduction in risk that occurs over time, while maintaining safety and security. The decommissioning process can be improved and made more efficient, open, and predictable by reducing the reliance on licensing actions (*i.e.*, license amendment and exemption requests) that reflect this reduction in risk to achieve a sustainable regulatory framework during decommissioning.

The NRC has also determined that changes to the regulations are appropriate with respect to drug and alcohol testing; cyber security; and foreign ownership, control, or domination of a production or utilization facility undergoing decommissioning.

In several areas, the current regulations do not distinguish between provisions that apply to a nuclear power reactor that has permanently ceased operations and provisions that apply to an operating nuclear power reactor. To address this, the NRC is proposing to amend its regulations in several areas to provide a regulatory framework for the transition from operating to decommissioning. This proposed rule is a four-step graded approach that is commensurate with the reduction in radiological risk at four levels of decommissioning: (1) Permanent cessation of operations and permanent removal of all fuel from the reactor vessel, (2) sufficient decay of fuel in the spent fuel pool (SFP) such that it would not reach ignition temperature within 10 hours under adiabatic heatup conditions (*i.e.*, a complete loss of SFP water inventory with no heat loss), (3) transfer of all fuel to dry storage, and (4) removal of all fuel from the site. The graded approach is a fundamental concept for this proposed rule.

Because the current regulatory framework for decommissioning is adequate to protect public health and safety and the common defense and security, many of the new requirements in this proposed rule are alternatives to current requirements.

B. Major Provisions

Major provisions of this proposed rule include changes in the following areas:

- *Emergency preparedness.* This proposed rule offers an alternative, graded approach to the current requirements for onsite and offsite radiological emergency preparedness at a nuclear power reactor. This approach would provide four levels of emergency planning standards that coincide with significant milestones in decommissioning that reflect the gradual reduction of the radiological risk during decommissioning.
- *Physical security.* This proposed rule would make certain changes that would apply once a nuclear power reactor enters decommissioning. These proposed changes would (1) permit a certified fuel handler (CFH) to approve the temporary suspension of security measures during certain emergency conditions or during severe weather, (2) remove the requirement that a licensee's physical protection program be

Review the Commenter's Checklist on Regulations.gov

- "Commenter's Checklist" link available on this comment submission form webpage: https://www.regulations.gov/commenton/NRC-2017-0227-0038
  - Also available in a printable format (also referred to Tips for submitting comments)

Next Steps

- Public comment period ends: **October 23, 2024**
- Final rule to the Commission: September 9, 2025 **(estimated)**
- Final rule publication: March 2026 **(estimated)**

Thank You!

Dennis Andrukat

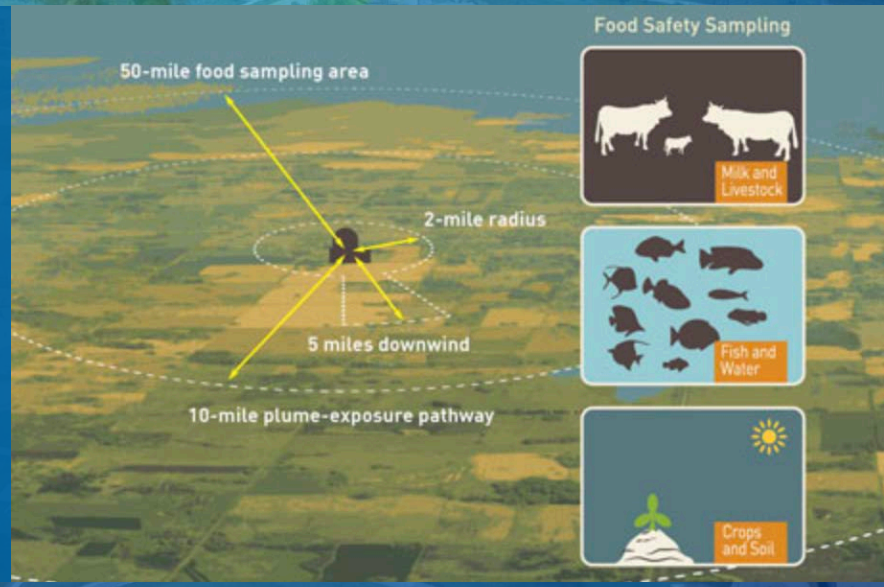
Project Manager –NMSS/REFS

Email: Dennis.Andrukat@nrc.gov

Regulations.gov docket ID: NRC-2017-0227

Please provide feedback on this public meeting using this link: https://www.nrc.gov/public-involve/public-meetings/contactus.html

NEI 24-05:
AN APPROACH FOR RISK-INFORMED PERFORMANCE-BASED EMERGENCY PLANNING



DAVE GRABASKAS
Manager, Licensing and Risk Assessments Group

Ben Chen, David Young, Bob Kahler, Karl Fleming, Amir Afzali, Dennis Henneke, Brandon Chisholm, Partha Chandran

U.S. DEPARTMENT OF ENERGY
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MOTIVATION AND BACKGROUND

EPZ GUIDANCE

EPZ EXAMPLE

PREVIOUS QUESTIONS

EMERGENCY PLAN GUIDANCE

MOTIVATION AND BACKGROUND

EPZ GUIDANCE

EPZ EXAMPLE

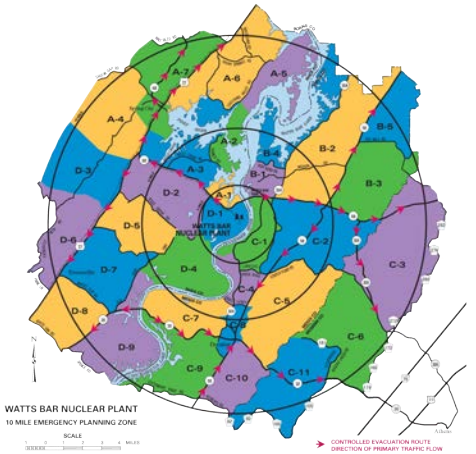
PREVIOUS QUESTIONS

EMERGENCY PLAN GUIDANCE

MOTIVATION

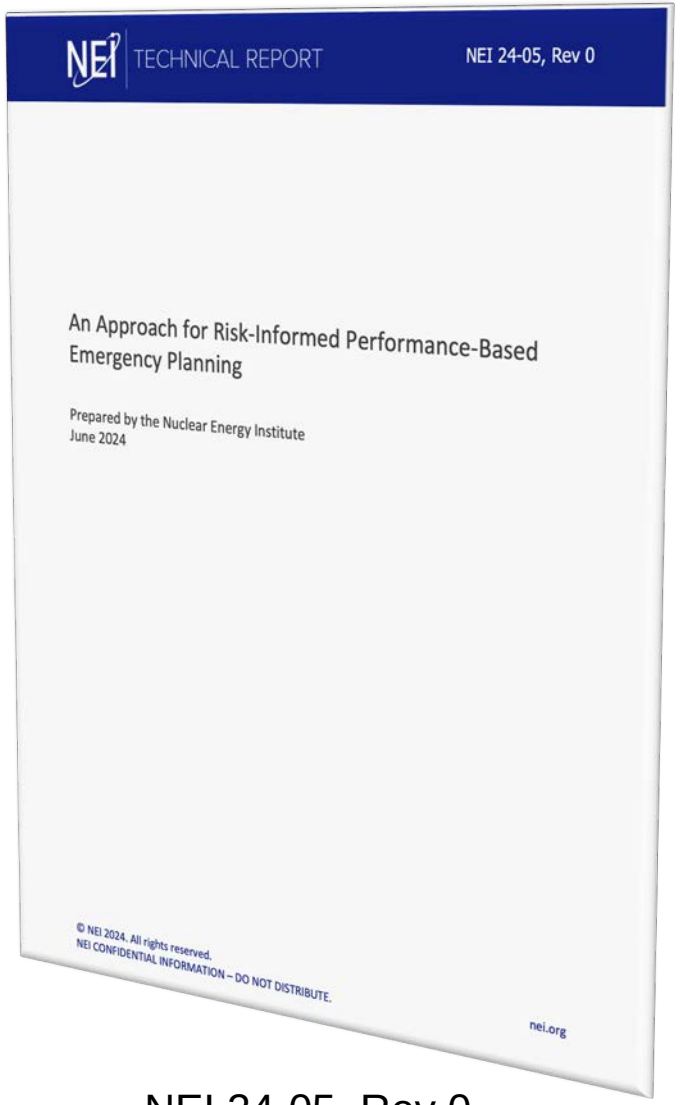
- **Emergency Preparedness:**
  - Historically, the LWR fleet has utilized large, uniform emergency planning zones (EPZs)
    - Plume exposure pathway EPZ: 10 miles
    - Ingestion exposure pathway EPZ: 50 miles
  - The advanced reactor industry seeks to size EPZs and develop emergency plans that are commensurate with plant risk to provide cost savings and operational simplicity
  - The NRC recently finalized a new emergency planning rulemaking (new 50.160 pathway), which provides such flexibility
  - While NRC guidance in RG 1.242 provides high-level methodologies, industry is seeking more detailed guidance, specifically associated with use of the Licensing Modernization Project (LMP)

Seabrook Siren Trucks



PROJECT OVERVIEW

- **Goal**
  - Establish an approach that leverages the insights from technology-inclusive RIPB design and licensing methods to develop an EP strategy that provides reasonable assurance of adequate protection of the public health and safety while allocating resources for dose savings in an efficient and effective manner.
- **Objective**
  - Develop an approach for deriving the plume exposure pathway EPZ and associated emergency plan elements (actions, resources, etc.) which integrates information from the LMP-based safety case.
- **Outcome**
  - Development of a guidance document that is submitted by industry to the NRC for review and endorsement



NEI 24-05, Rev 0

PROJECT TEAM

- **Argonne Team (PI)**
- **LMP Developers**
  - Amir Afzali (Aalo Atomics)
  - Karl Fleming (KNF Consulting)
- **Industry**
  - Dennis Henneke (GE-Vernova)
  - Partha Chandran (GE-Vernova)
  - Brandon Chisholm (Southern Company)
- **Emergency Preparedness Experts**
  - Bob Kahler (Former Branch Chief of NRC Emergency Preparedness Policy and Oversight Branch 2001-2021)
  - David Young (NEI, Senior Technical Advisor – Security and Incident Preparedness)
- **Expert Reviewers**
  - Mark Cunningham (Former Director of NRC Division of Risk Assessment)
  - Keith Woodard (Radiological consequence expert)
  - ANS Risk-Informed Emergency Preparedness Working Group

PROJECT SCOPE AND BENEFITS

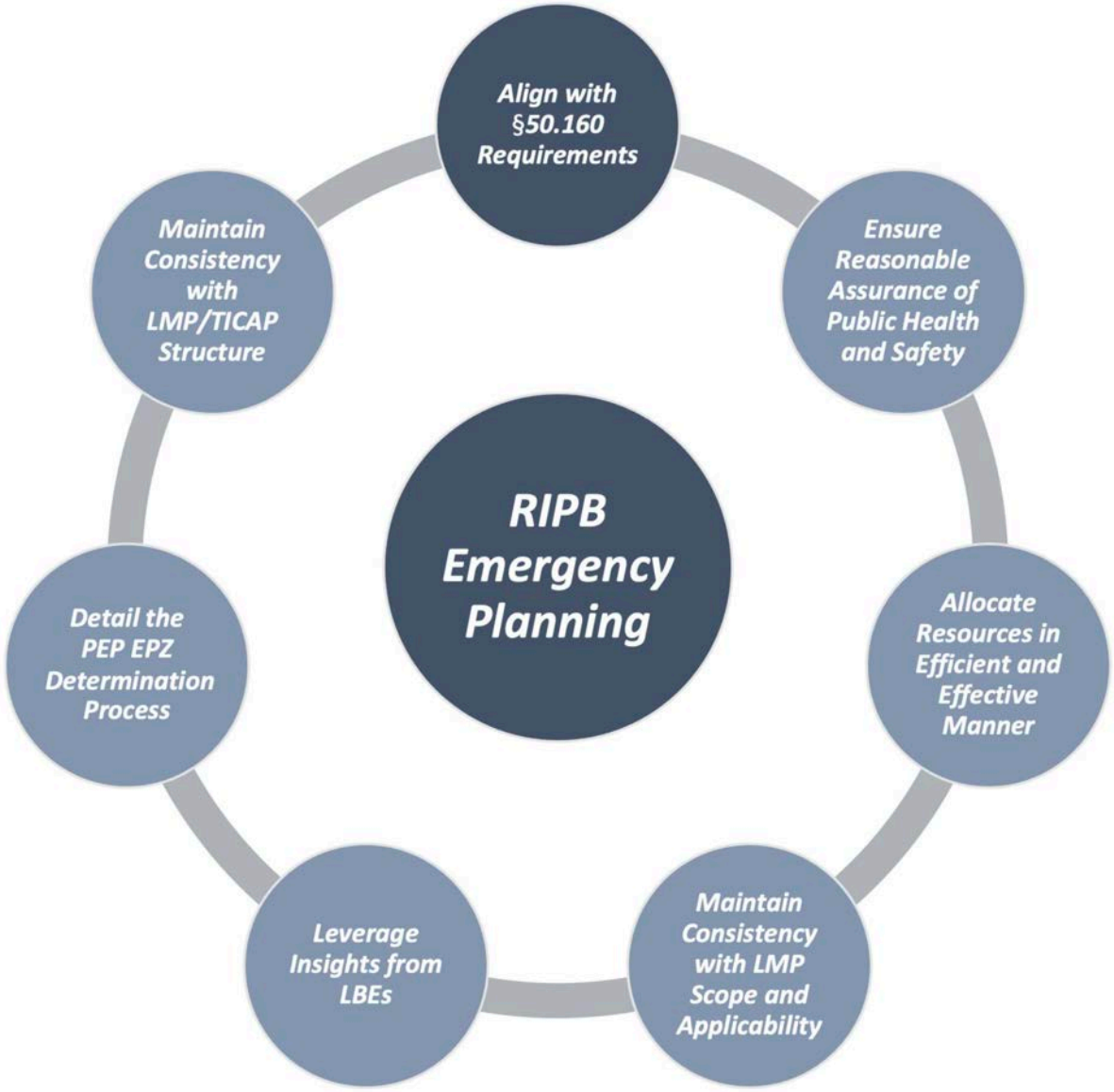
- **Scope**
  - Utilization of the Licensing Basis Events (LBEs) and associated attributes (such as frequency, timing, consequence, etc.) identified through the LMP approach as a comprehensive spectrum of potential events to inform:

    1) The determination of the PEP EPZ.

    2) The development of appropriate emergency plans (actions, resources, coordination, etc.), including consideration of the ingestion pathway.

PROJECT SCOPE AND BENEFITS

- **Benefits**
  - Alignment with new 50.160 pathway alleviates need for exemptions
  - Integration with LMP provides:
    - A plant-wide analysis that can include all sources of radioactivity and all initiators (internal and external)
    - A structured and comprehensive approach for *credible* event selection to inform EPZ sizing and development of the emergency plan
    - Event frequency and consequence information from LBEs
    - A consistent DID framework where emergency planning is part of DID adequacy analysis performed by the integrated decision-making process



MOTIVATION AND BACKGROUND

EPZ GUIDANCE

EPZ EXAMPLE

PREVIOUS QUESTIONS

EMERGENCY PLAN GUIDANCE

NRC EP RULEMAKING (2023)

- **Plume Exposure Pathway (PEP) EPZ Determination**:
  - The new 50.160 pathway retains the plume exposure pathway (PEP) EPZ but removes the ingestion pathway EPZ, which is addressed by referencing available capabilities
  - The new EPZ regulation provided in 50.33(g)(2)(i) has two criteria:

> **50.33(g)(2)(i):** The plume exposure pathway EPZ is the area within which:
>
> (A)Public dose, as defined in § 20.1003 of this chapter, is projected to exceed 10 mSv (**1 rem**) total effective dose equivalent over 96 hours from the release of radioactive materials from the facility considering accident likelihood and source term, timing of the accident sequence, and meteorology; **AND**
>
> (B) Pre-determined, prompt protective measures are necessary.

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- **Plume Exposure Pathway (PEP) EPZ Determination**:
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>
> (B) Pre-determined, prompt protective measures are necessary.

NRC EP RULEMAKING (2023)

- **Plume Exposure Pathway (PEP) EPZ Determination**:
  - The new 50.160 regulation is structured for three possible outcomes of the EPZ determination process:
    - EPZ beyond the site boundary (SB)
    - EPZ at the SB
    - No EPZ

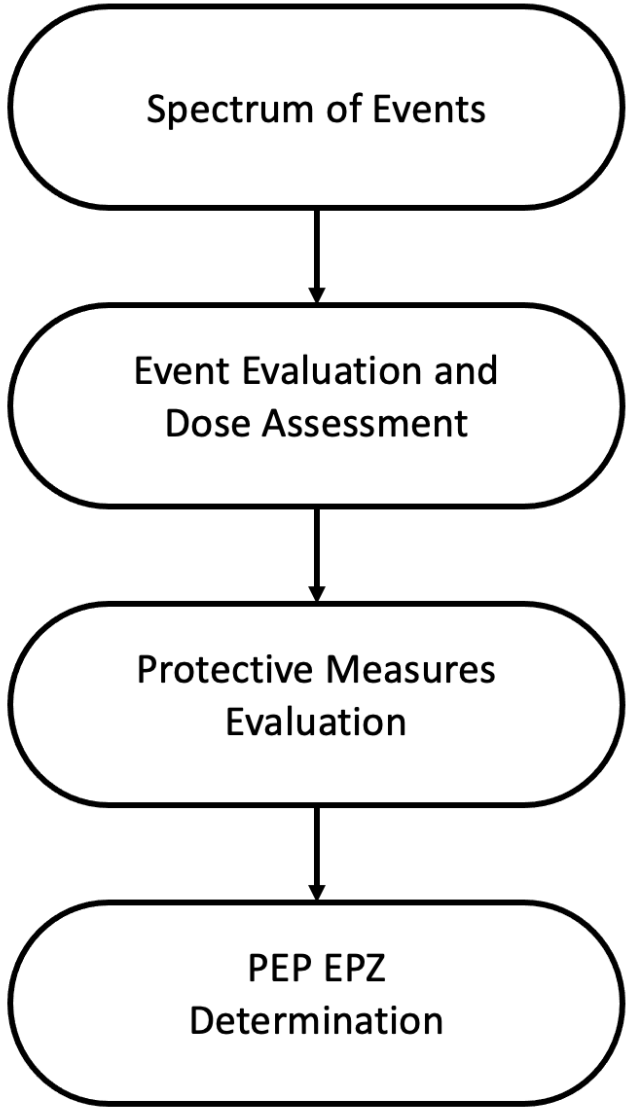
Outcome	Additional Emergency Plan Requirements[1]	Additional Requirement Description
PEP EPZ > SB	• 50.160(b)(1)(iv)(B) • 50.160(b)(3)	• Discuss offsite response • Describe the PEP EPZ
PEP EPZ = SB	• 50.160(b)(3)	• Describe the PEP EPZ
No PEP EPZ		

[1] In addition to the emergency plan requirements provided in 50.160(a), (b)(1)(i) – (iv)(A), (b)(2), (b)(4), and (c).

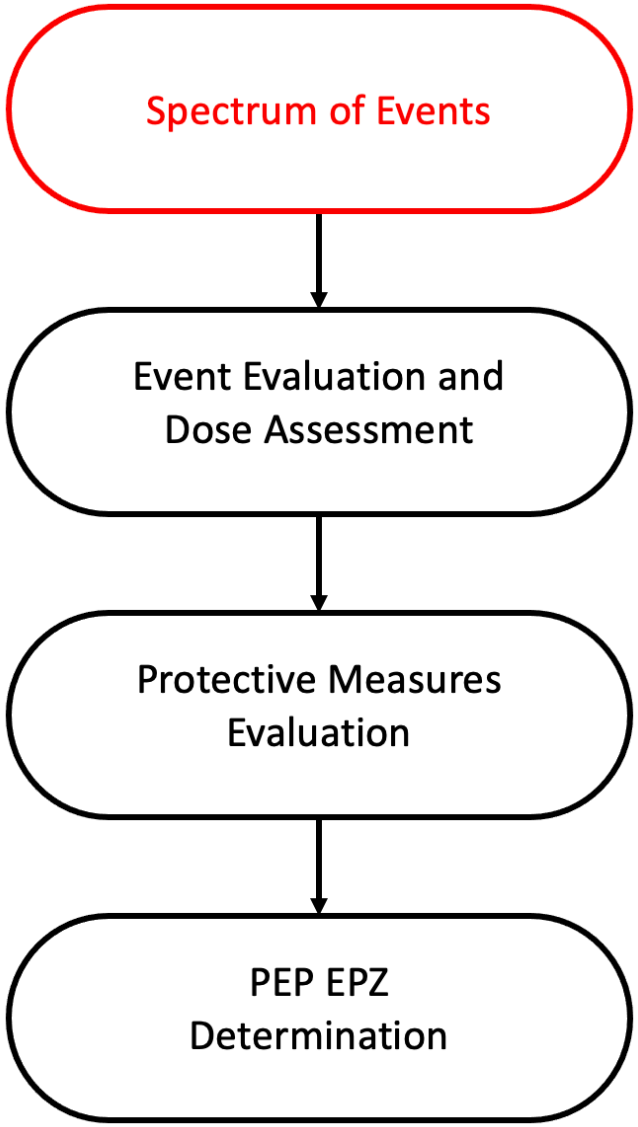
PEP EPZ DETERMINATION PROCESS

- **Started with a clean-slate but used precedent as guide**
  - Taking a broader look at appropriate criteria while looking for simplifications and how LMP-derived information can be used to predictably provide data regarding the **major considerations** for 50.33(g)(2)(i)(A) (accident likelihood, source term, timing, meteorology)
- **Remembering the goal**
  - Establish an approach for EP that provides reasonable assurance of adequate protection while allocating resources in an efficient and effective manner for dose savings to workers and the public.
- **The EPZ is just one part of EP**
  - EPZ the area for *predetermined, prompt* protective actions.
  - The identified LBEs will also inform other aspects of EP.

PEP EPZ DETERMINATION PROCESS



PEP EPZ DETERMINATION PROCESS

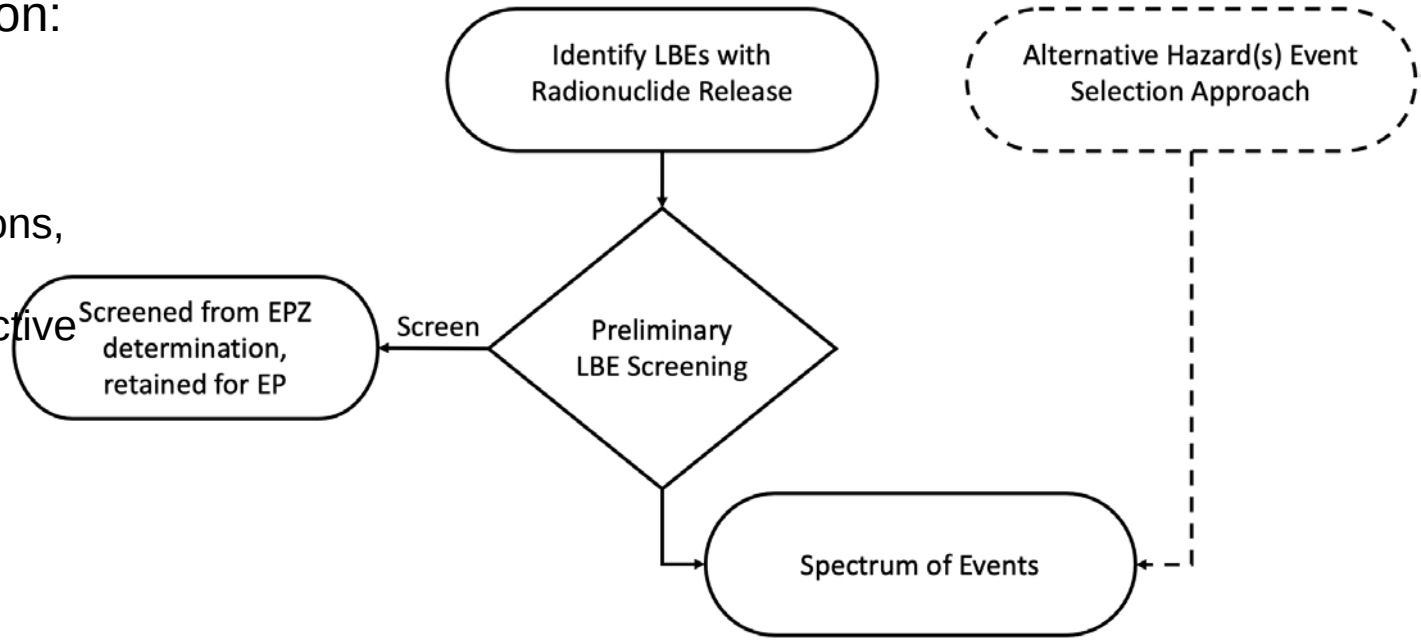


PEP EPZ: SPECTRUM OF EVENTS

The process starts with those LBEs (AOOs, DBEs, and BDBEs) with radionuclide release.

Preliminary screening is possible dependent on:

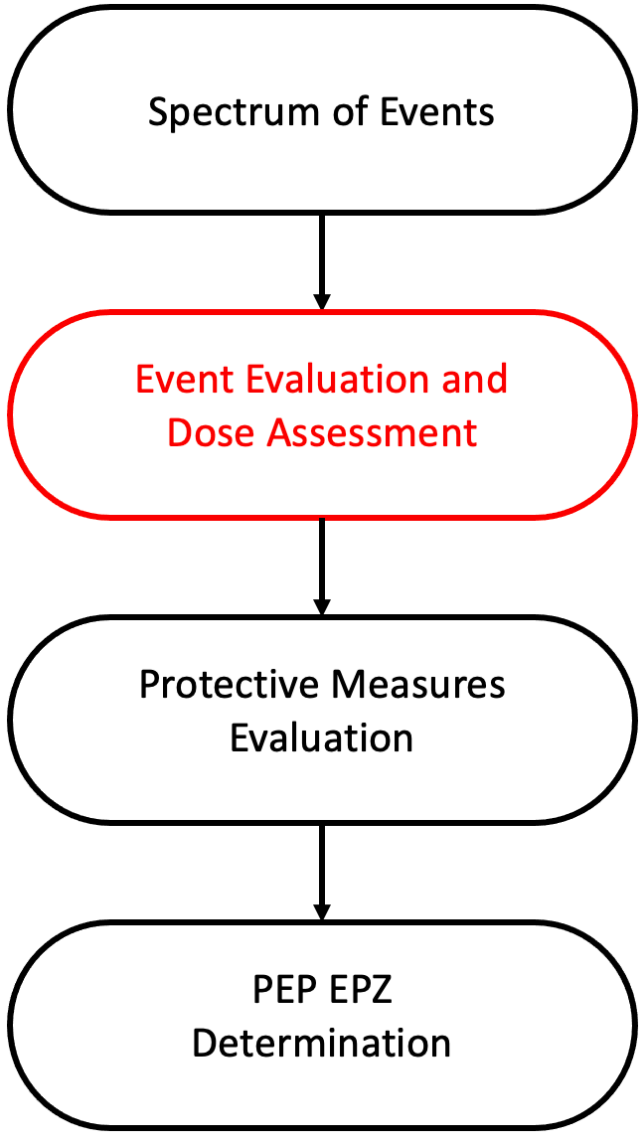
- Dose size (very small releases)
- Timing:
  - Time from accident initiation to radionuclide release (including recognition of need for actions, which may not occur at time zero)
  - Time from radionuclide release to when protective actions are necessary



The preliminary screening reduces the effort necessary for subsequent analyses

If a hazard is analyzed outside of the PRA/LMP, it is also included in the spectrum of events

PEP EPZ DETERMINATION PROCESS

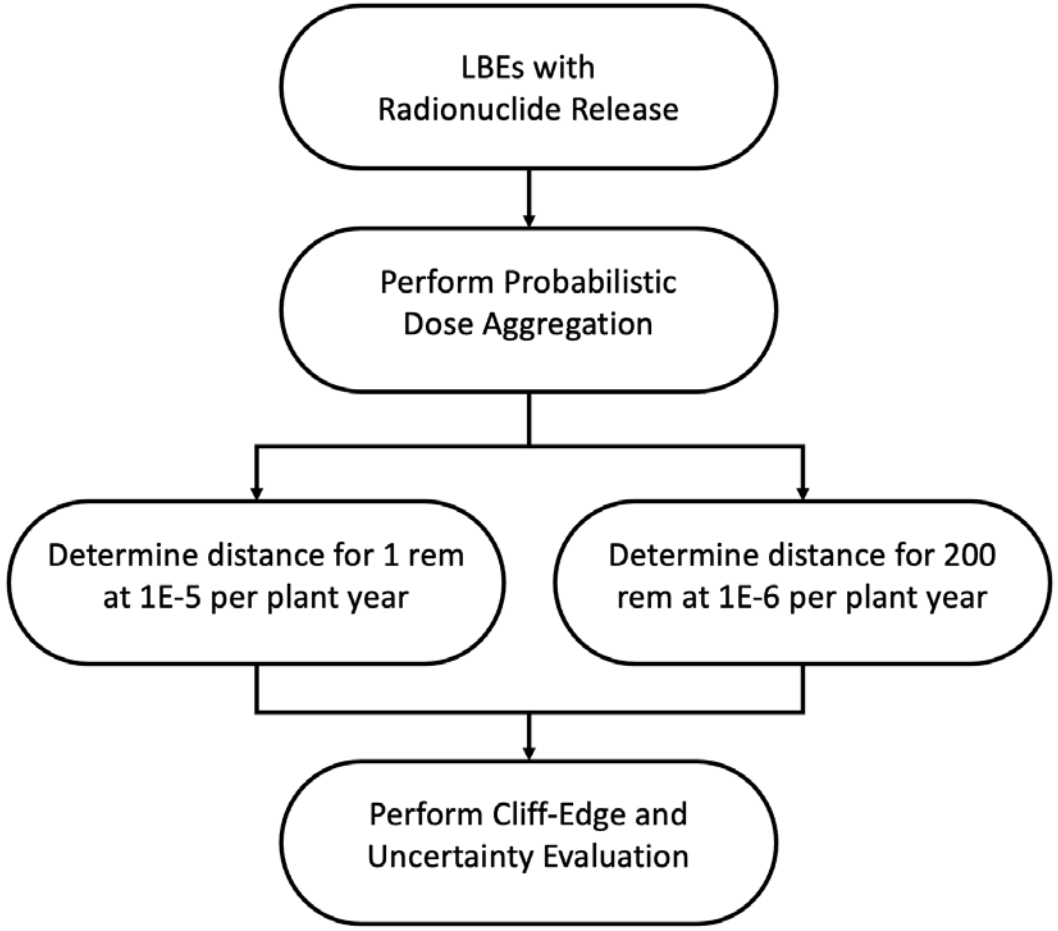


PEP EPZ: EVENT AND DOSE EVALUATION

For those non-screened LBEs with radionuclide release, a probabilistic dose aggregation is performed and dose-versus-distance curves* are created for 1 rem and 200 rem.

Aligns with Appendix A of RG 1.242 and the historic approach utilized in NUREG-0396.

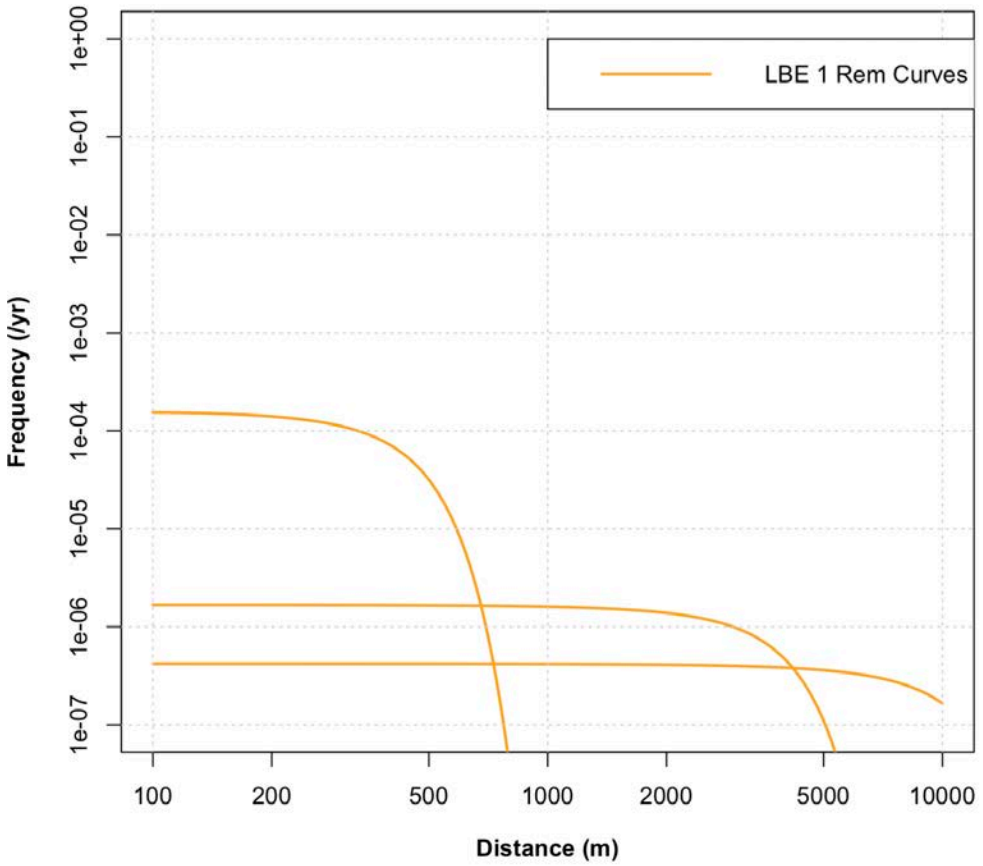
Analyses are performed utilizing ***cumulative*** dose-versus-distance curves (a plant-holistic perspective).



*Applicants may select pre-determined distance for analysis, such as EAB.

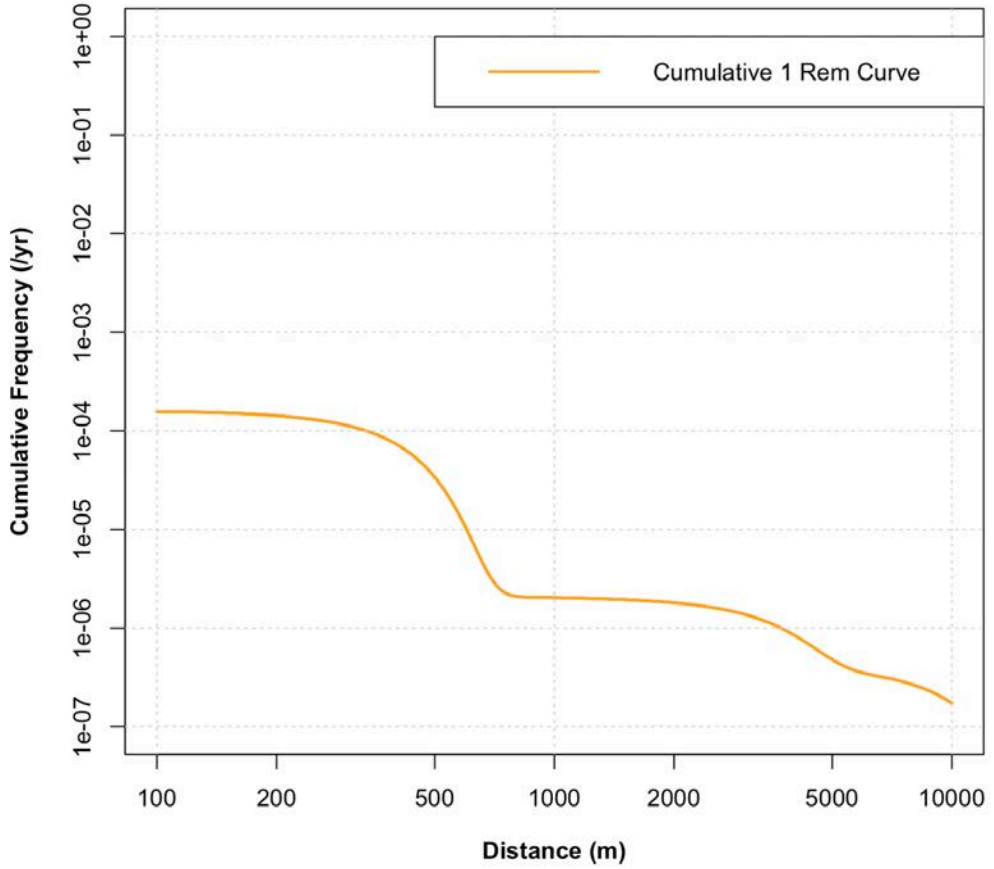
PEP EPZ: EVENT AND DOSE EVALUATION

Individual LBEs



Aggregation

Cumulative



Mean values of frequency and dose are utilized for the analysis

PEP EPZ: EVENT AND DOSE EVALUATION

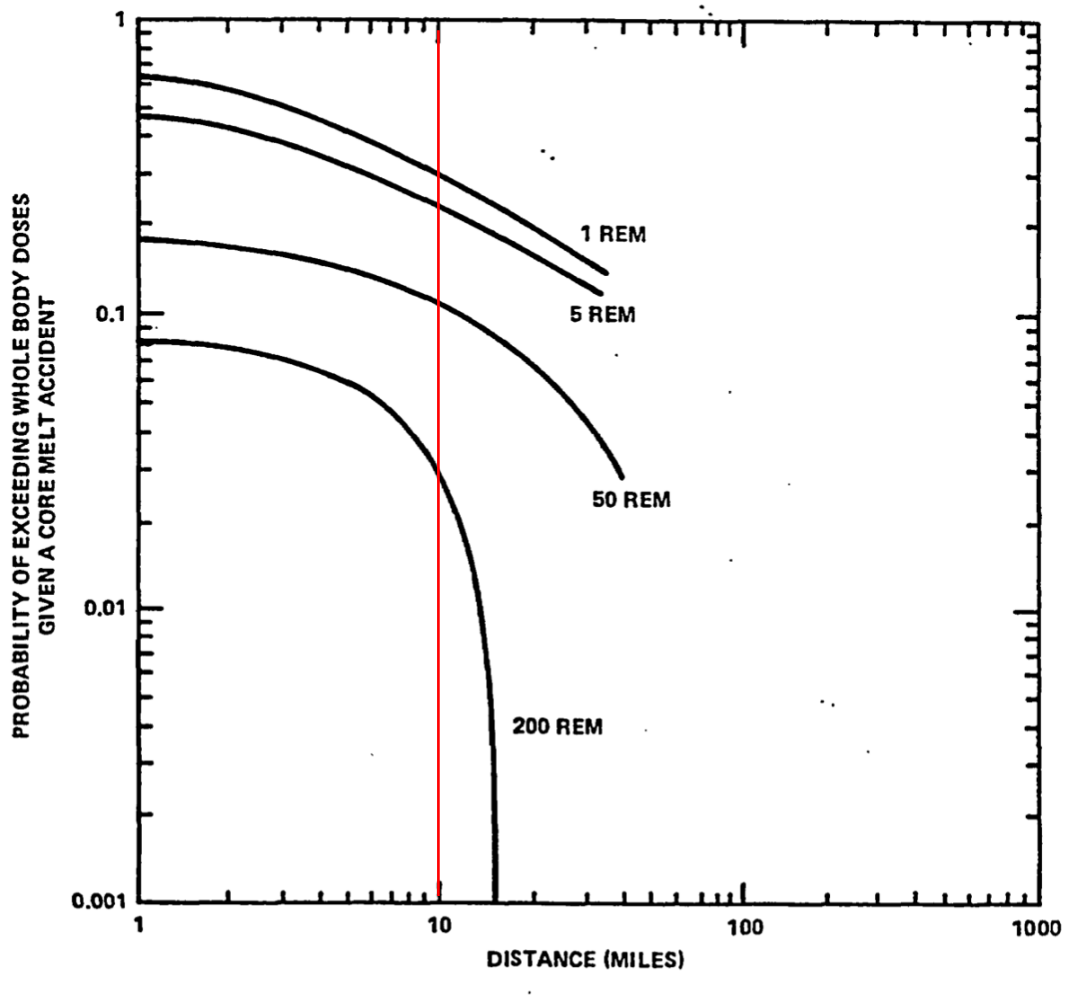


Figure I-11. Conditional Probability of Exceeding Whole Body Dose Versus Distance. Probabilities are Conditional on a Core Melt Accident (5×10^{-5}).

Determination of Frequency Criteria:
In NUREG-0396, probabilistic dose aggregation curves based on WASH-1400 were used to partially derive the 10-mile plume exposure EPZ

A distance of 10 miles corresponds to:

- 0.3 condition probability on 1 rem curve

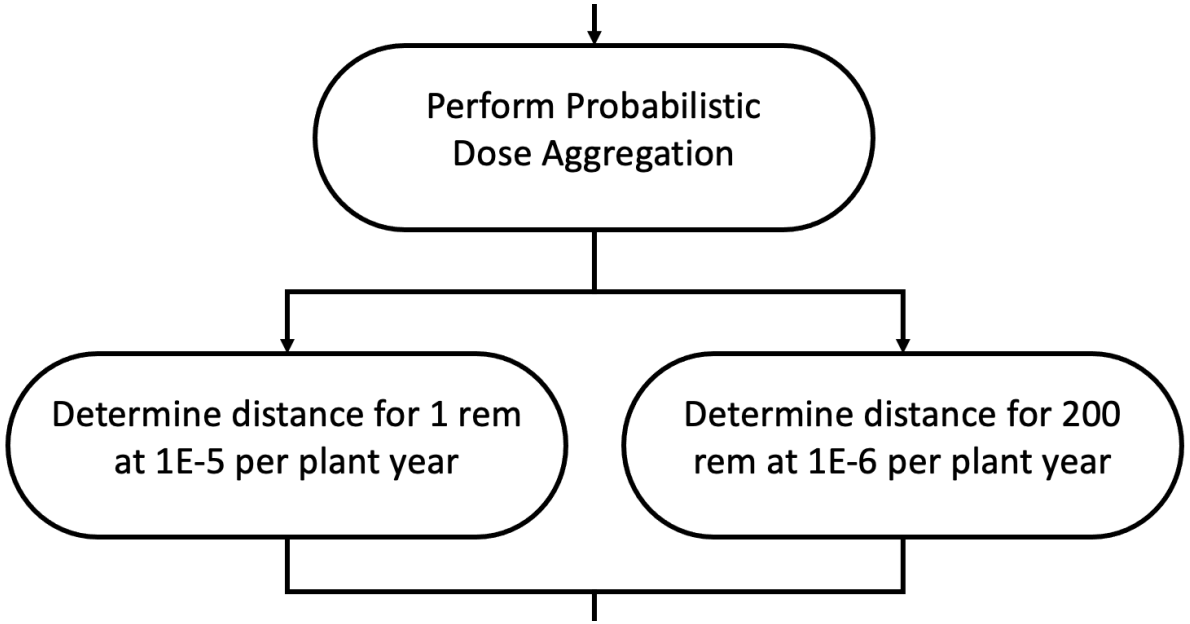
  (0.3 x 5E-5 /yr = 1.5E-5 /yr)

- 0.03 conditional probability on 200 rem curve

  (0.03 x 5E-5 /yr = 1.5E-6 /yr)

Note: WASH-1400 only considered full power internal events and the radionuclide source from one reactor.

PEP EPZ: EVENT AND DOSE EVALUATION



Based on NUREG-0396, two frequencies were selected for the probabilistic dose aggregation curve comparison:

Criterion A:

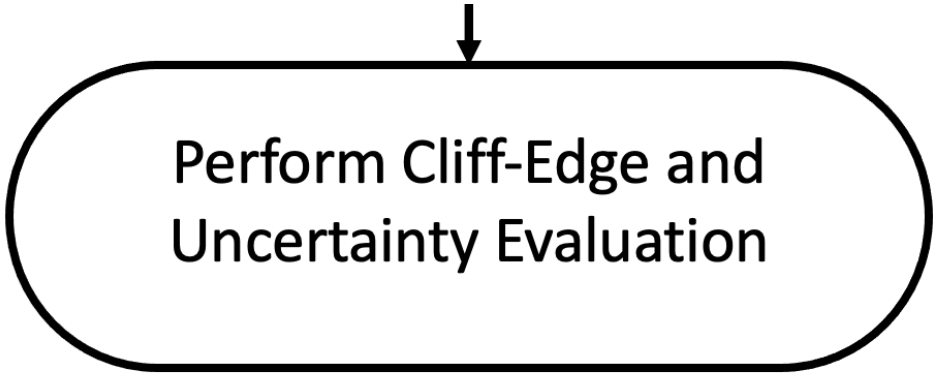
- 1 rem at 1E-5 per plant year cumulative freq.
- Aligns with 50.33(g)(2)(i)(A/B) and consistency with historic criteria.

Criterion B:

- 200 rem at 1E-6 per plant year cumulative freq.
- Consistency with historic criteria
- Provides additional confidence regarding the need for *predetermined, prompt* actions for low frequency, potentially high consequence events

The criteria guide decision-making, they are not strict quantitative thresholds

PEP EPZ: EVENT AND DOSE EVALUATION



Following the assessment, an uncertainty analysis and cliff-edge evaluation is performed.

Aligns with Appendix B of RG 1.242

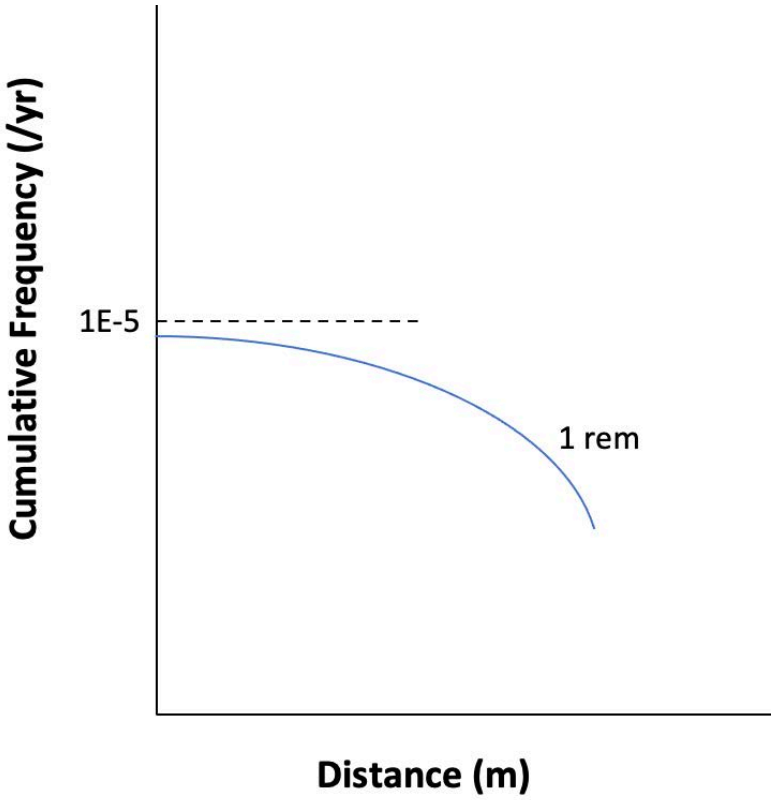
Specific approach left to vendor, given the diverse nature of uncertainties and methods for addressing, but could include:

- Assessment at 95th percentile
- Bounding/conservative analysis
- Sensitivity analysis

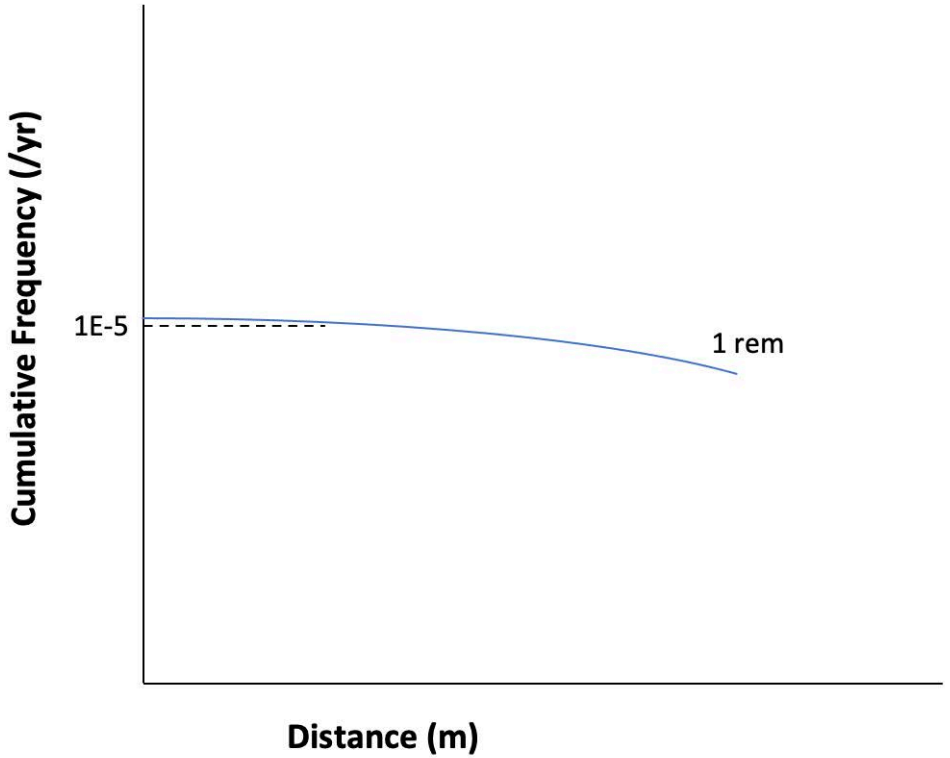
The goal is to identify cases such as the following…

PEP EPZ: EVENT AND DOSE EVALUATION

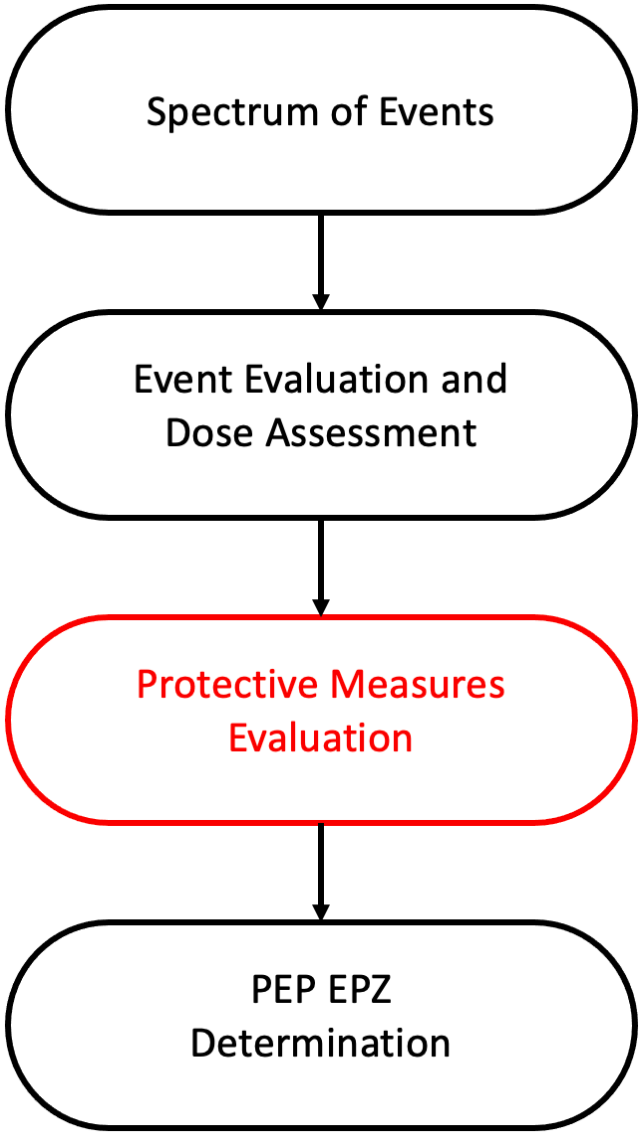
Metric just below criterion



Small change in metric causes significantly different result



PEP EPZ DETERMINATION PROCESS

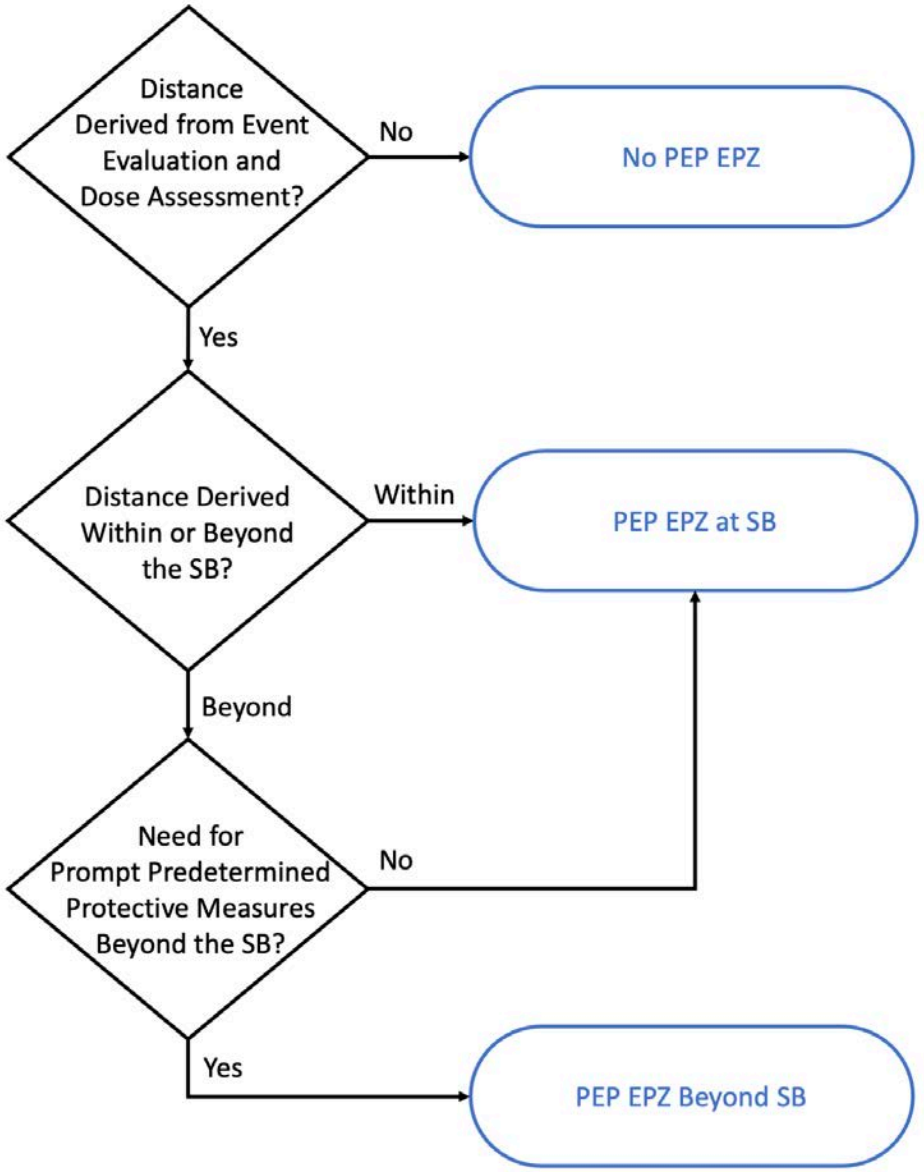


PEP EPZ: PROTECTIVE MEASURES EVALUATION

If **no distance** is derived from the dose evaluation, then no PEP EPZ is established.

If a distance is derived **within** the SB, then the PEP EPZ is set at the SB, in accordance with the requirements in §50.160(b)(1)(iii)(B) for onsite protective actions (more on this later).

If a distance is derived **beyond** the SB, then a protective measures evaluation is performed to determine the need for *prompt, predetermined* protective measures.



EVALUATION

Although doses may exceed the EPA PAGs beyond the SB, there may be situations where prompt, predetermined proactive actions are not necessary. Considerations include:

LBE Characteristics

- *Timing of release, including time for ad hoc actions*
- *Release characteristics, such as types and forms of radionuclides*
- *Initiating event type, such as external hazards*

Site Characteristics

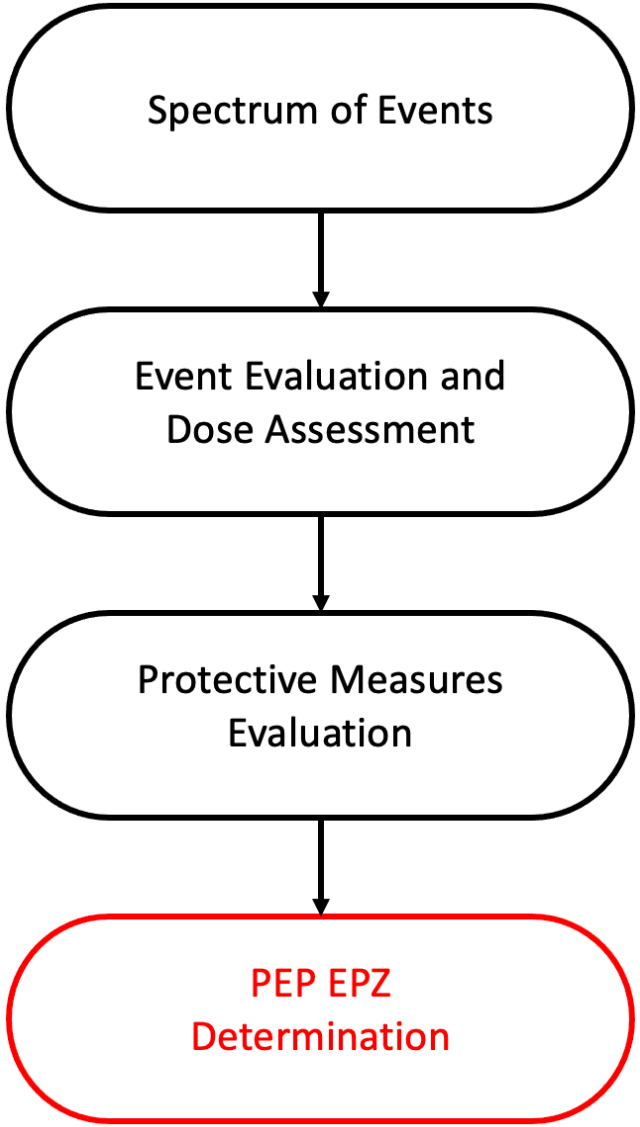
- *Population distribution, such as remote sites*
- *Release pathways and direction, such as spatial dose assessment results*
- *Presence of co-located facilities*

Effectiveness

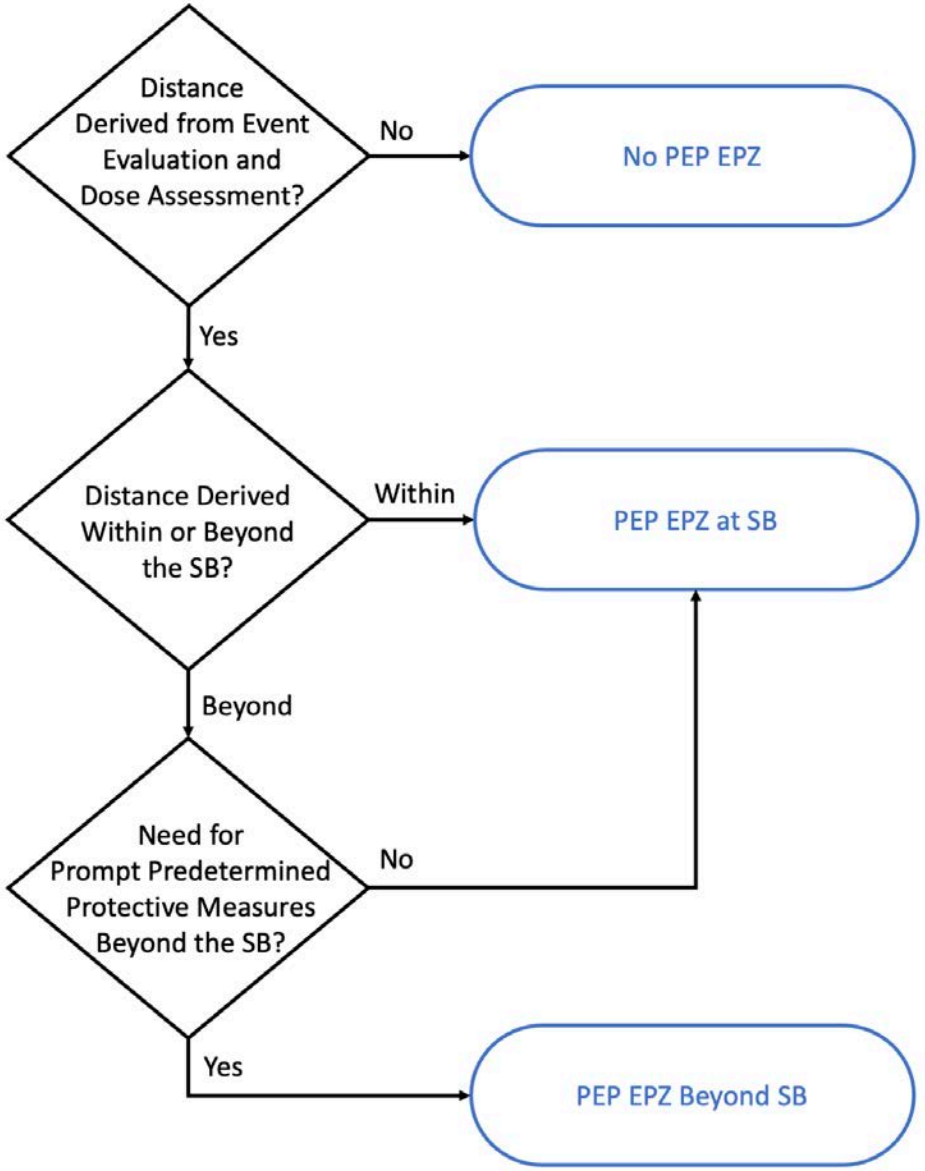
- *Evaluation of effectiveness of protective action strategies for dose savings*
- *Comparison of doses with and without actions*
- *Evaluation of capabilities of local organizations for ad hoc actions*

The findings of this analysis are reviewed by the **IDPP** to assess DID adequacy when considering uncertainties, model limitations, etc.

PEP EPZ DETERMINATION PROCESS



PEP EPZ: DETERMINATION



MOTIVATION AND BACKGROUND

EPZ GUIDANCE

EPZ EXAMPLE

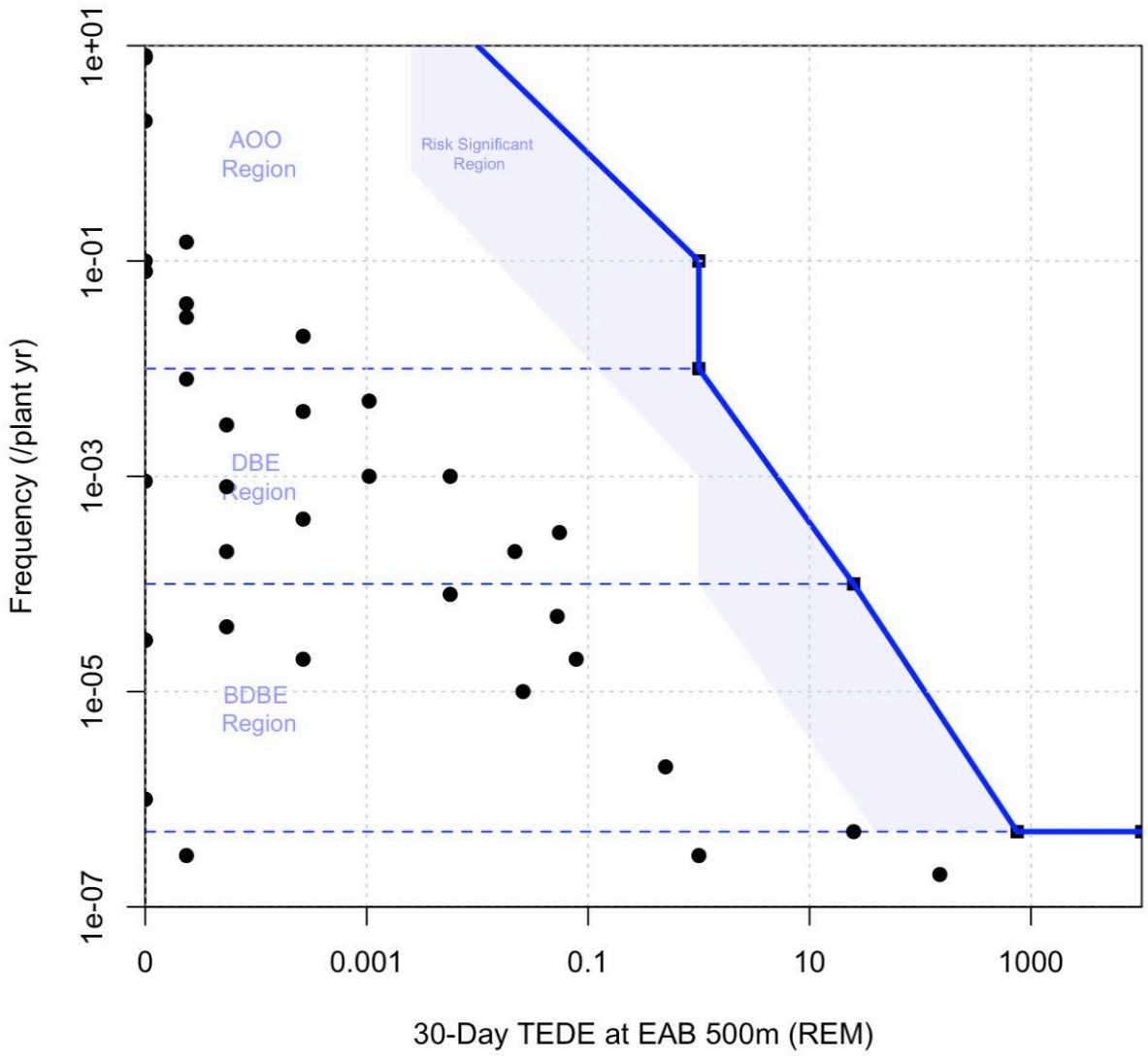
PREVIOUS QUESTIONS

EMERGENCY PLAN GUIDANCE

PEP EPZ: EXAMPLE

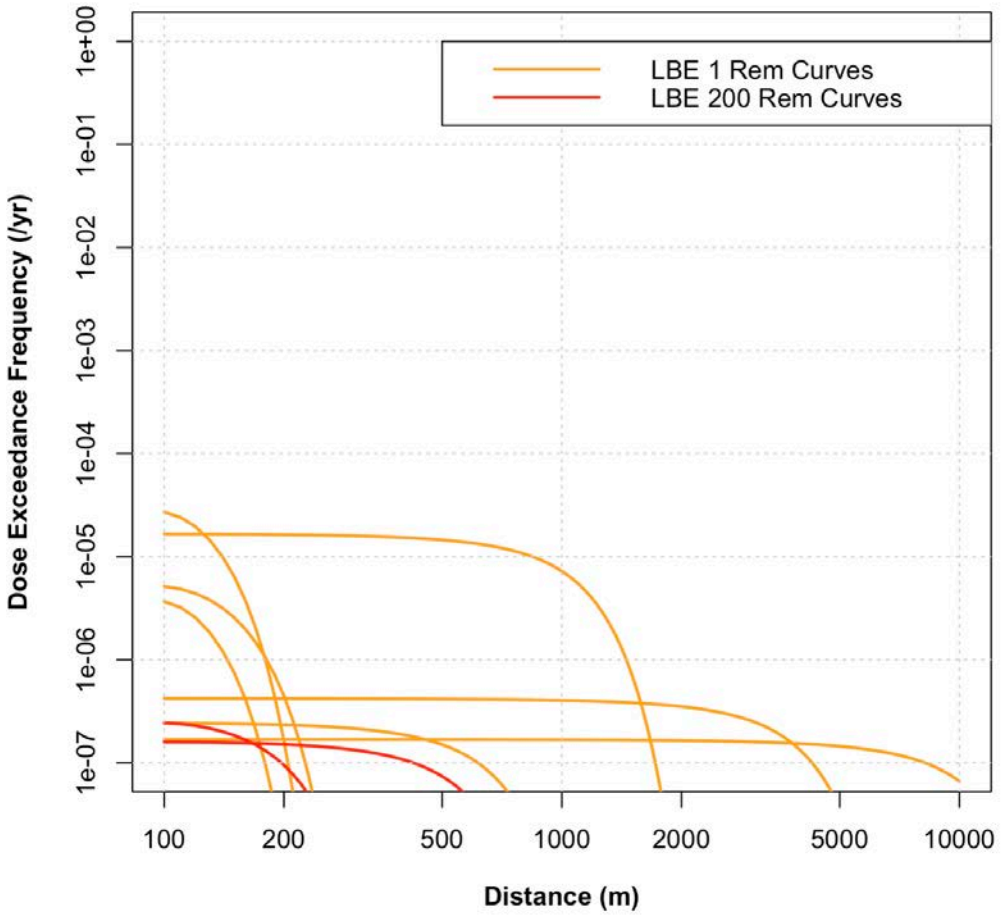
- **Example Plant**
  - Simplified example based on advanced reactor design and PRA experience
  - Assume a uniform SB at a distance of 500m

- **LMP Analysis and LBEs**
  - 38 LBEs identified, including 26 that involve radionuclide release
  - No preliminary screening performed

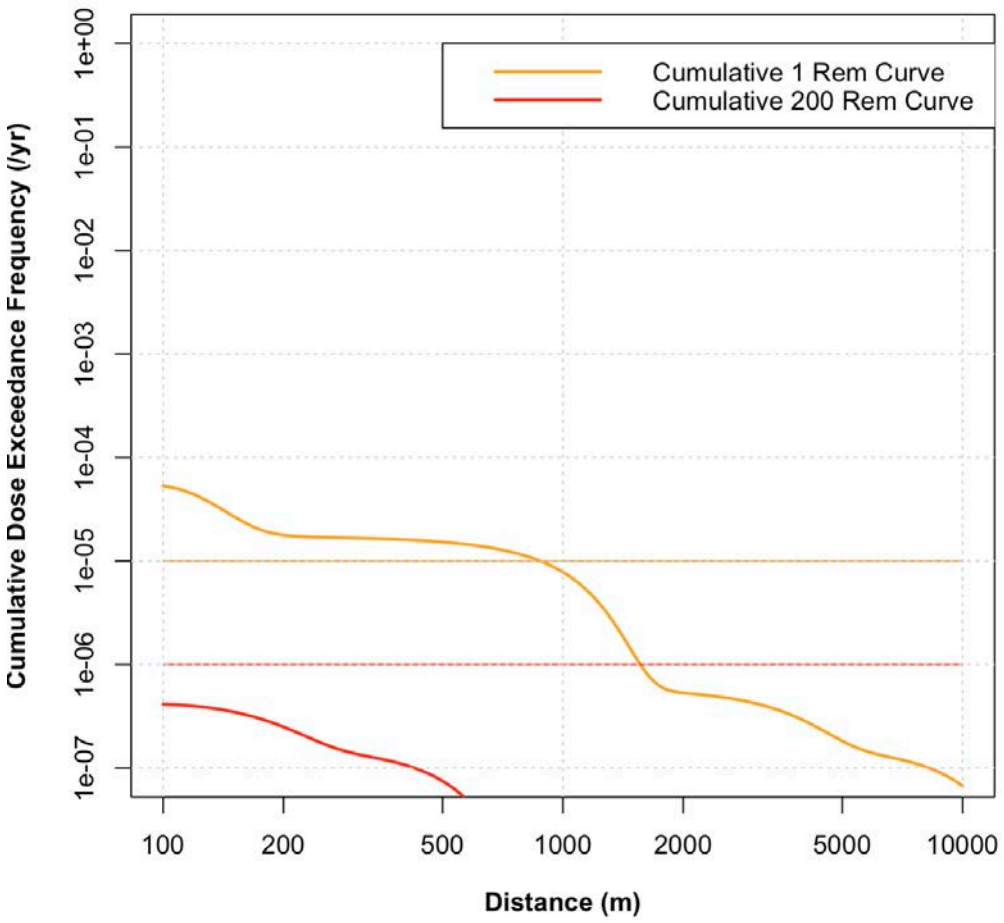


PEP EPZ: EXAMPLE

- **Probabilistic Dose Aggregation**

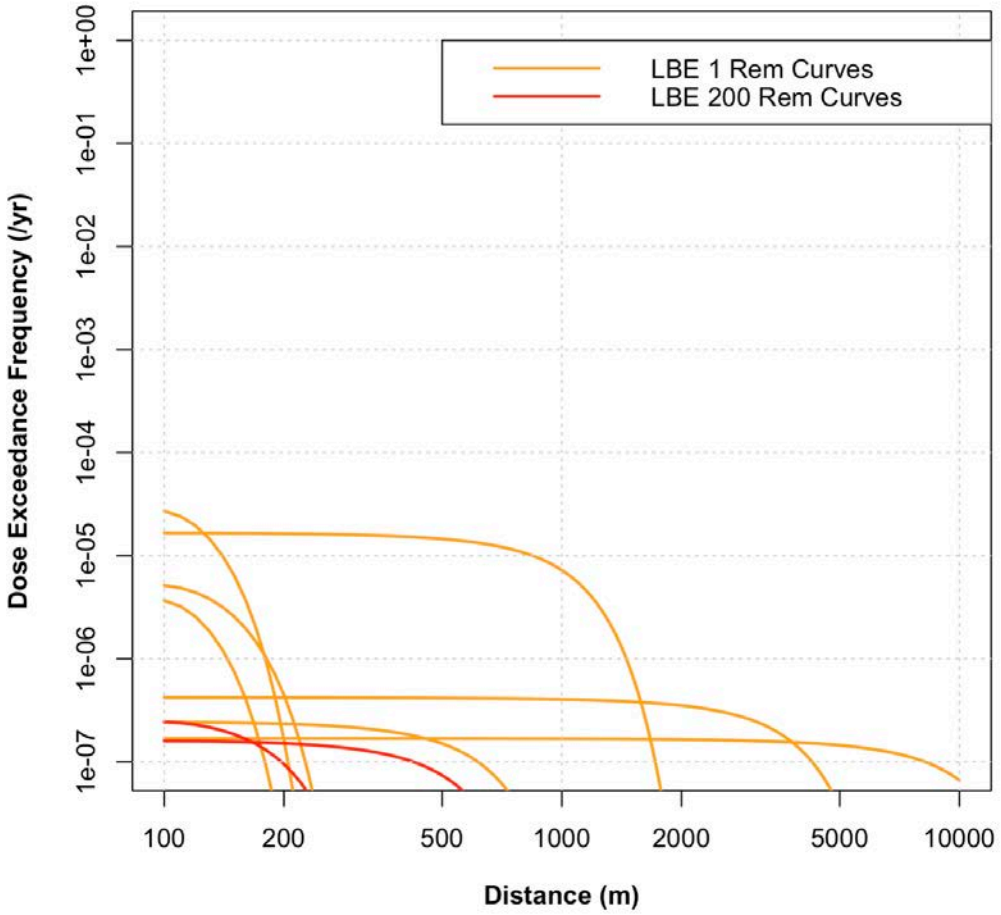


Aggregation

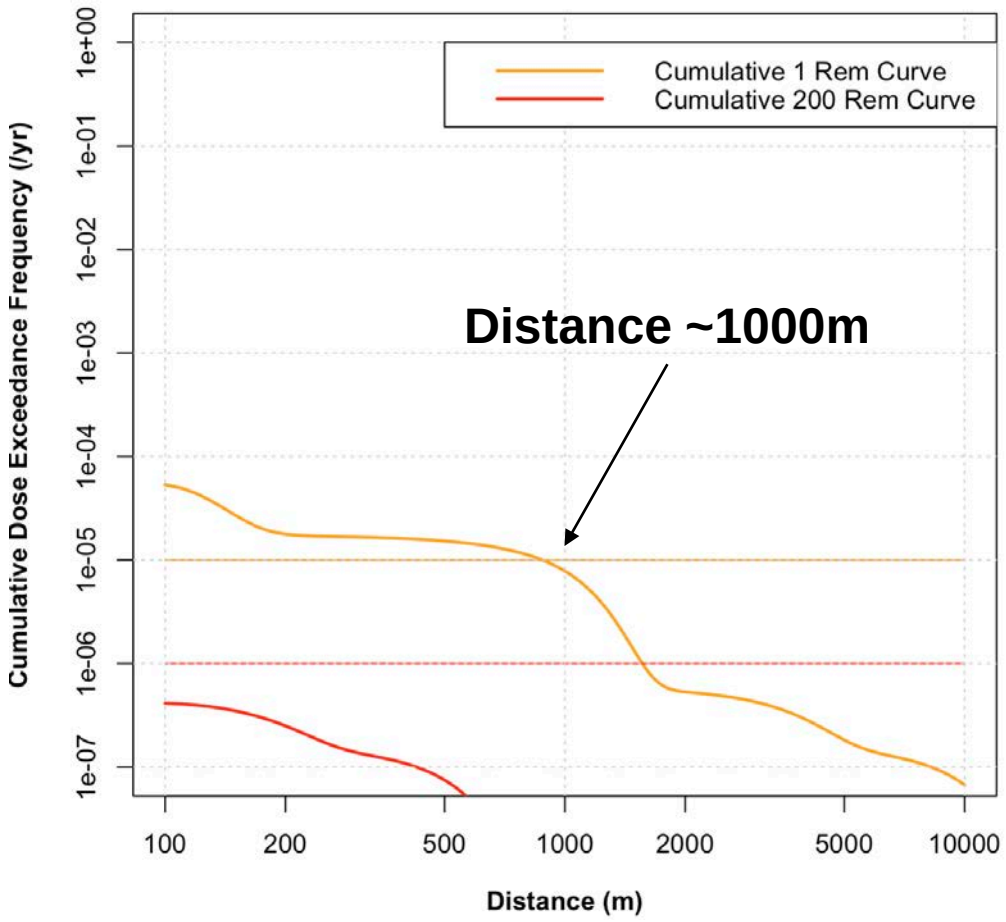


PEP EPZ: EXAMPLE

- **Probabilistic Dose Aggregation**

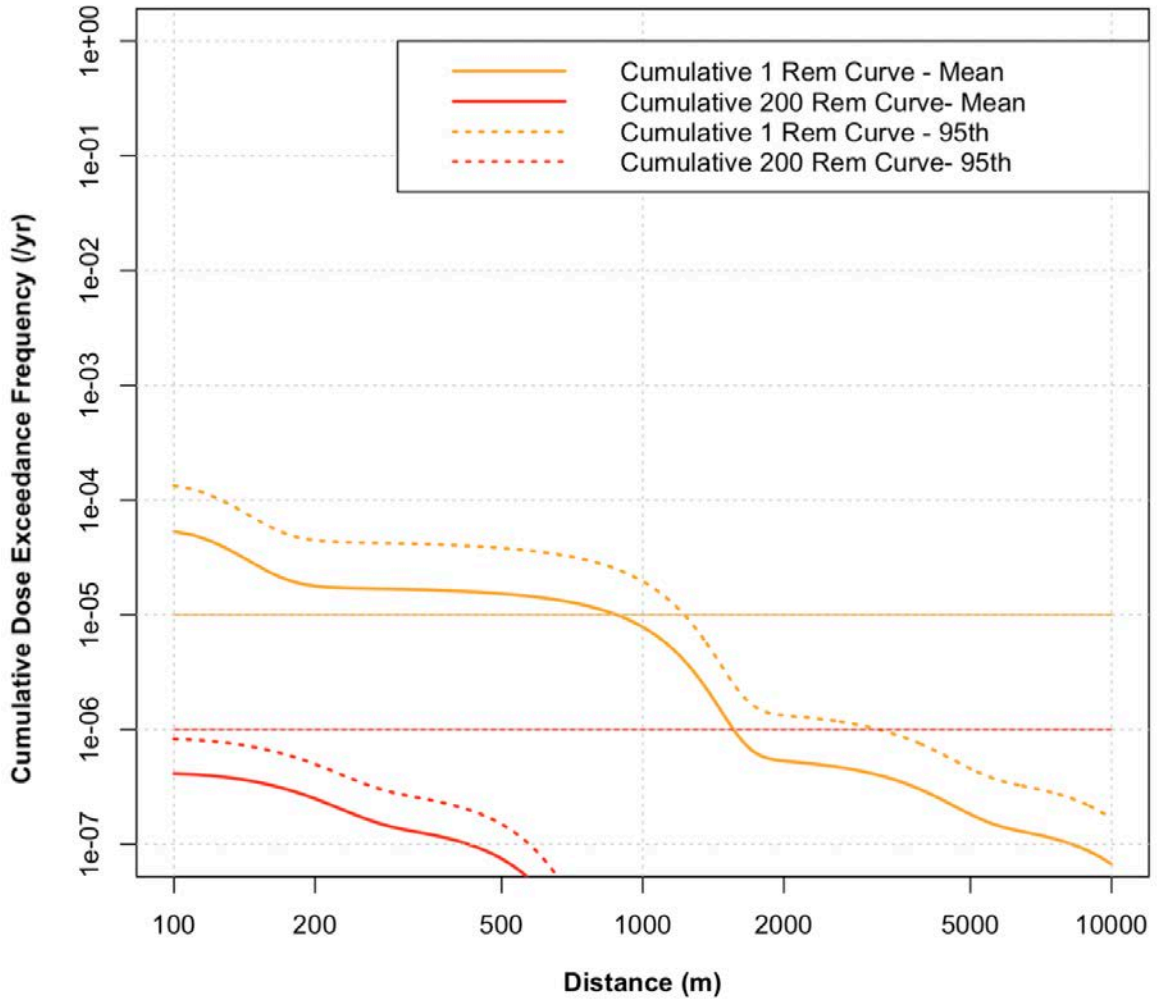


Aggregation



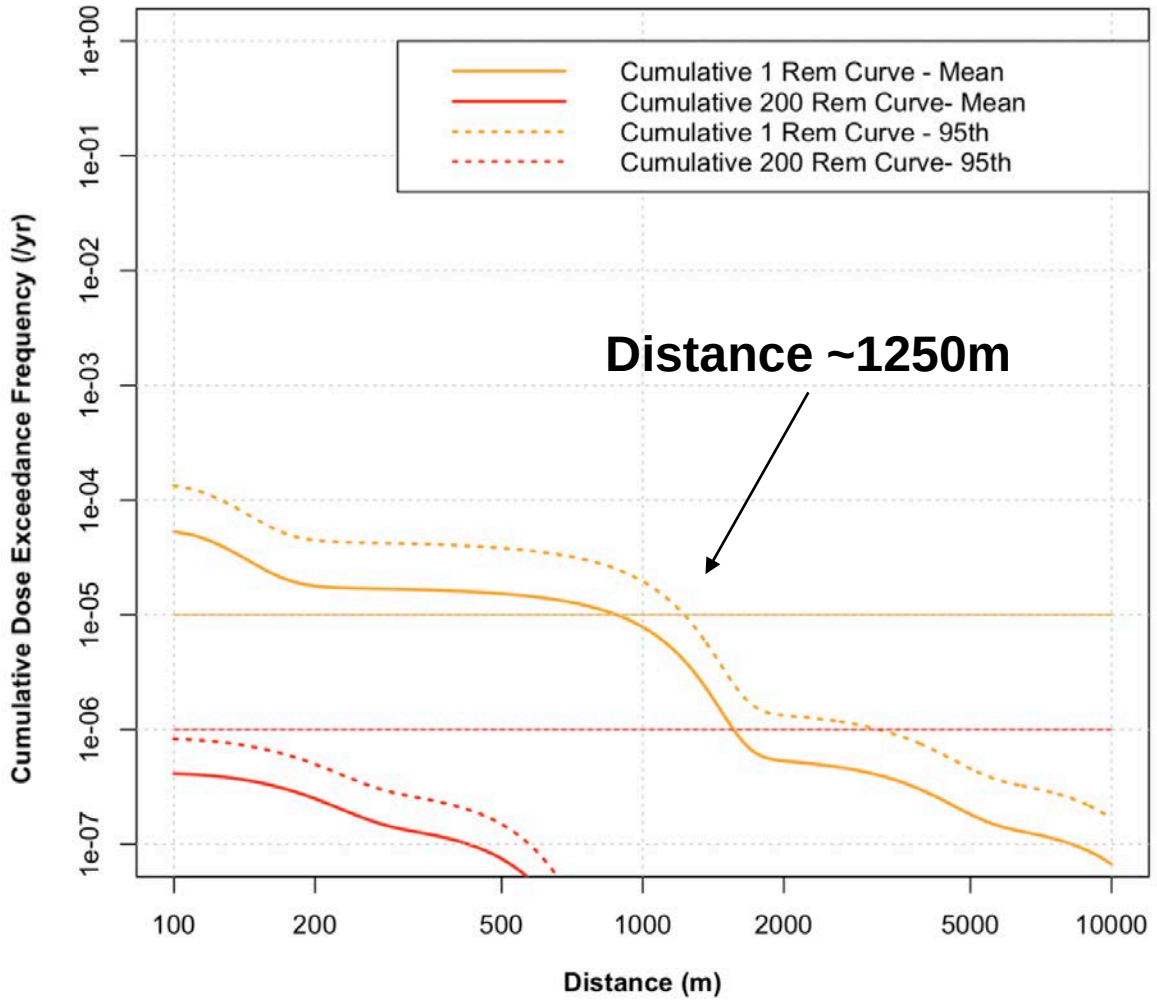
PEP EPZ: EXAMPLE

- **Uncertainty & Cliff-Edge Analysis**



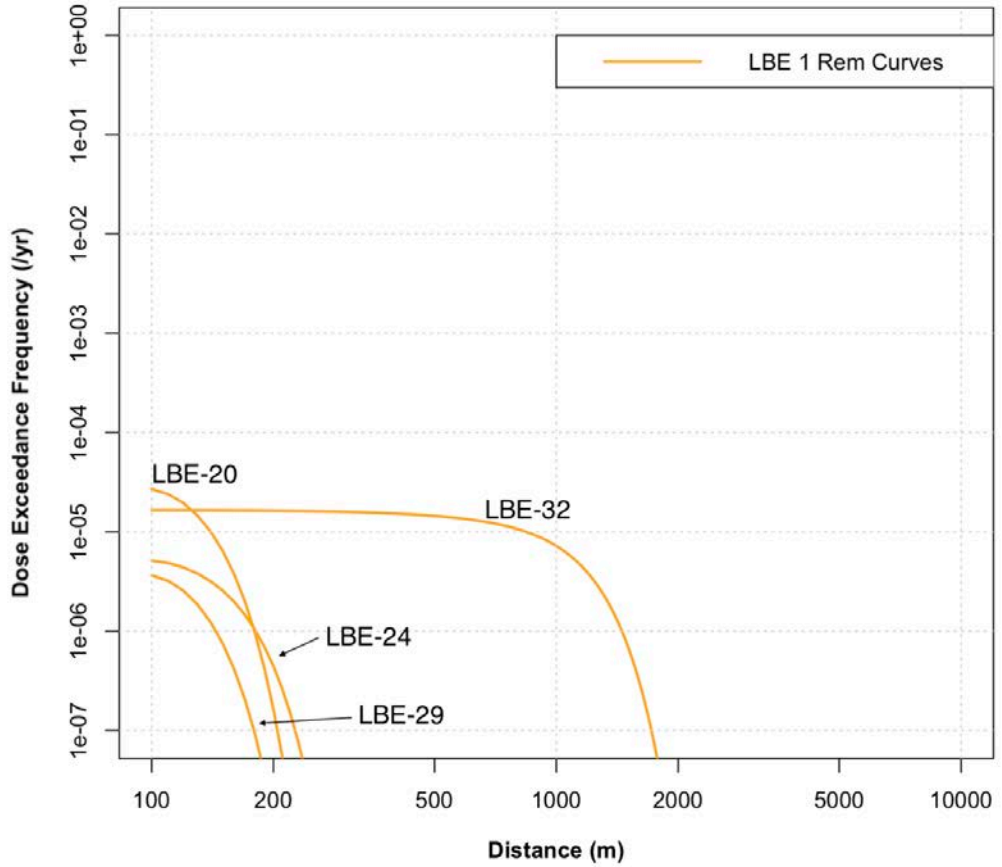
PEP EPZ: EXAMPLE

- **Uncertainty & Cliff-Edge Analysis**



PEP EPZ: EXAMPLE

- **Protective Measures Evaluation**
  - Since the derived distance is beyond the SB, a protective measures evaluation is performed, which focuses on those LBEs contributing to the curve.
  - Only LBE-32 contributes to the 1 rem exceeding the PAGs beyond the SB; however, the protective measures evaluation determines prompt, predetermined protectives actions are not warranted.



LBE	Event Description	Protective Measures Evaluation
LBE-32	Core damage event due to extended (multi-day) loss of heat removal with successful radionuclide retention barriers mitigating total radionuclide release.	Significant time available for event recognition and protective measure execution by OROs before radionuclide release occurs.

PEP EPZ: EXAMPLE

- **Result**

Analysis Step	Assessment
Spectrum of Events	LBEs identified through LMP approach, no alternative hazard event selection considerations.
Event Evaluation and Dose assessment	The LBE assessment resulted in the following findings: **Criterion A**: 1 rem curve – Distance of 750m to 1000m **Criterion B**: 200 rem curve – No distance derived **Uncertainty/Cliff-Edge Assessment**: 1 rem curve may extend to 1250m due to uncertainty
Protective Measures Evaluation	Beyond the SB: • One LBE contributed to doses exceeding the EPA PAGs beyond the SB; however, there is adequate time for OROs to implement protective measures. • Predetermined, prompt protective measures are not warranted. Within the SB: • Four LBEs contribute to the 1 rem curve within the SB. • Protective measures were developed for onsite personnel, given the nature of the releases.
PEP EPZ Determination	The analysis determined that doses exceeding the EPA PAGs were possible beyond the SB but predetermined, prompt protective measures are not warranted. Within the SB, protective measures are warranted. **Therefore, the PEP EPZ is established at the SB (500m).**

MOTIVATION AND BACKGROUND

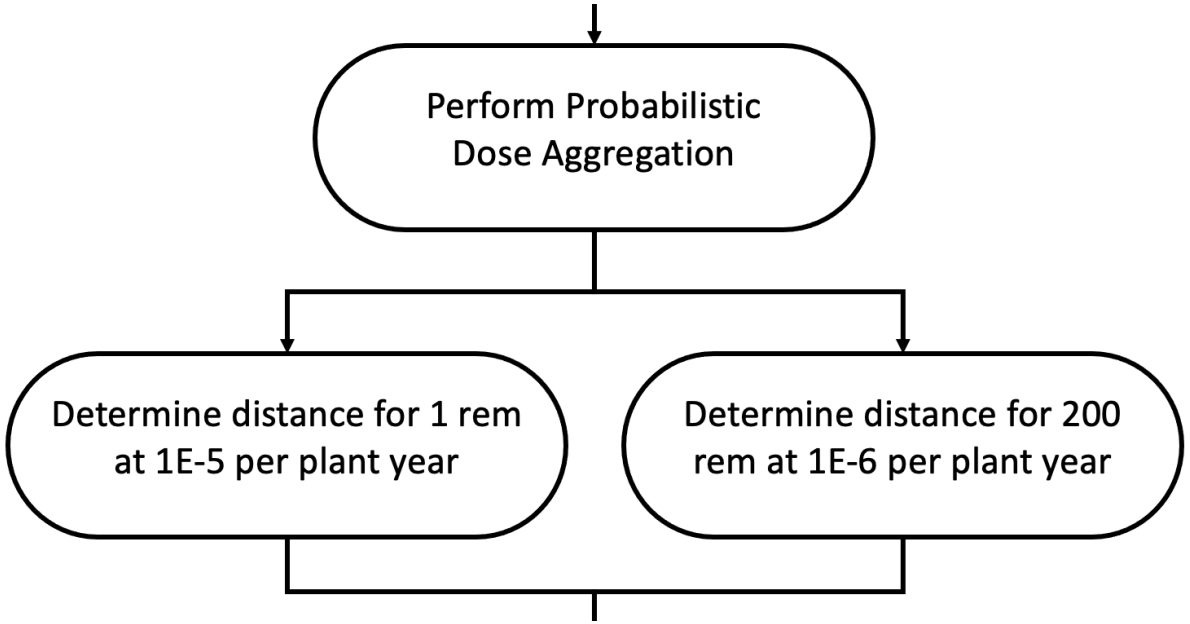
EPZ GUIDANCE

EPZ EXAMPLE

PREVIOUS QUESTIONS

EMERGENCY PLAN GUIDANCE

PEP EPZ: DETERMINATION



Question: Why not lower frequency criteria?
Consistent with NUREG-0396 and demonstrates that *predetermined, prompt* protective actions from the plant and local response organizations are not warranted as they are not an efficient and effective use of their resources:

Criterion A:

- The likelihood of exceeding the PAGs outside the EPZ is less than 1 in 100,000 plant-years.
- If U.S. operating 100 reactors, 0.1% chance of a reactor event requiring protective actions outside the EPZ in a given year (NUREG-0396 consideration).

Criterion B:

- The likelihood of an event resulting in early health effects beyond the EPZ is less than 1 in 1,000,000 plant years.

PEP EPZ: DETERMINATION

Question: What are the implications of a SB EPZ?

50.33(g)(2)(i) contains two criteria for EPZ determination:

1) Exceed 1 rem over 96 hours (with considerations of timing, source term, etc.) **and**
2) Prompt, predetermined protective measures are necessary

However, *predetermined, prompt* protective measures are those actions taken by offsite response organizations (OROs) to protect the public in **offsite** locations.

Therefore, within the developed approach, protection of the public **onsite** is the responsibility of the licensee under §50.160(b)(1)(iii)(B) and included within the site response plan.

Further discussion with the NRC likely necessary to ensure consistent understanding and that regulations are being addressed properly.

PEP EPZ: DETERMINATION

Question: What about Design Basis Accidents (DBAs)?

NUREG-0396 examined the consequence associated with a spectrum of potential accidents, derived from environmental reports, DBAs, and WASH-1400.

Within the developed approach, the LMP analysis includes a PRA that is far more comprehensive than WASH-1400.

- Event sequences that are analogous to DBAs are included in the PRA and addressed at their appropriate frequency level.
- Historically, DBAs were primary driver for plant design with PRA providing supplemental information. In LMP, the roles are essentially reversed, with PRA leading and DBAs providing supplemental insights.

Why not include DBAs without a consideration of frequency?

- The goal of the approach is to allocate resources in the most efficient and effective manner for dose savings. Utilizing realistic risk information is the best avenue for accomplishing this goal. Adding postulated accident sequences could distort the findings and cause a misallocation of resources
- Would result in SR SSC classification decisions impacting EP (*EP is not a design tool*)

PEP EPZ: DETERMINATION

Question: What about security events?

The new NRC EP rulemaking does not include security events and they are not evaluated as part of LMP. However, the consideration of such events is important for a comprehensive EP strategy.

An applicant should state that security events are removed from detailed consideration in the facility's PEP EPZ technical basis. This decision should be supported by documenting:

- The LBEs that were used to establish the basis for the EPZ size, and
- Compliance with regulatory requirements to protect against applicable design-basis and beyond-design-basis threats.

The basis should also discuss the facility's security-by-design features and available capabilities for mitigating beyond-design-basis events.

The applicant should conclude that, based on the above information, the consequences from security-related events are adequately considered in the determination of the PEP EPZ.

PEP EPZ: DETERMINATION

Question: Why "integration" with LMP?

1) The DID adequacy reviews within LMP, including assessments by the IDPP, provide a structured, comprehensive framework that can be leveraged for EP decision-making, such as the protective measures evaluation

2) The LMP integrated risk metric results (the QHOs) may depend on the execution of protective measures. Therefore, the results of the EPZ determination process must feed back to the LMP analyses to ensure consistency.
   - This is also consistent with the inclusion of protective measures in LWR QHO assessments.

MOTIVATION AND BACKGROUND

EPZ GUIDANCE

EPZ EXAMPLE

PREVIOUS QUESTIONS

EMERGENCY PLAN GUIDANCE

EMERGENCY PLAN: OVERVIEW

- **Emergency Plan Guidance**
  - In general, only high-level guidance is provided given the diverse nature of advanced reactors, unlike existing NEI LWR EP guidance docs
  - Focus areas include:
    - Emergency classification levels (ECLs)
    - Emergency action levels (EALs)
    - Initiating conditions (ICs)
    - Protective actions
    - Hazard analysis

§50.160	Description	Comment
(a)	Definitions	No Additional Guidance Provided
(b)(1)(i)	Maintenance of Performance	Supplemental Guidance Provided
(b)(1)(ii)	Performance Objectives	No Additional Guidance Provided
(b)(1)(iii)	Emergency Response	Supplemental Guidance Provided
(b)(1)(iv)	Planning Activities	Supplemental Guidance Provided
(b)(2)	Hazard Analysis	Supplemental Guidance Provided
(b)(3)	PEP EPZ	Supplemental Guidance Provided
(b)(4)	Ingestion Pathway	Supplemental Guidance Provided
(c)	Implementation	No Additional Guidance Provided .

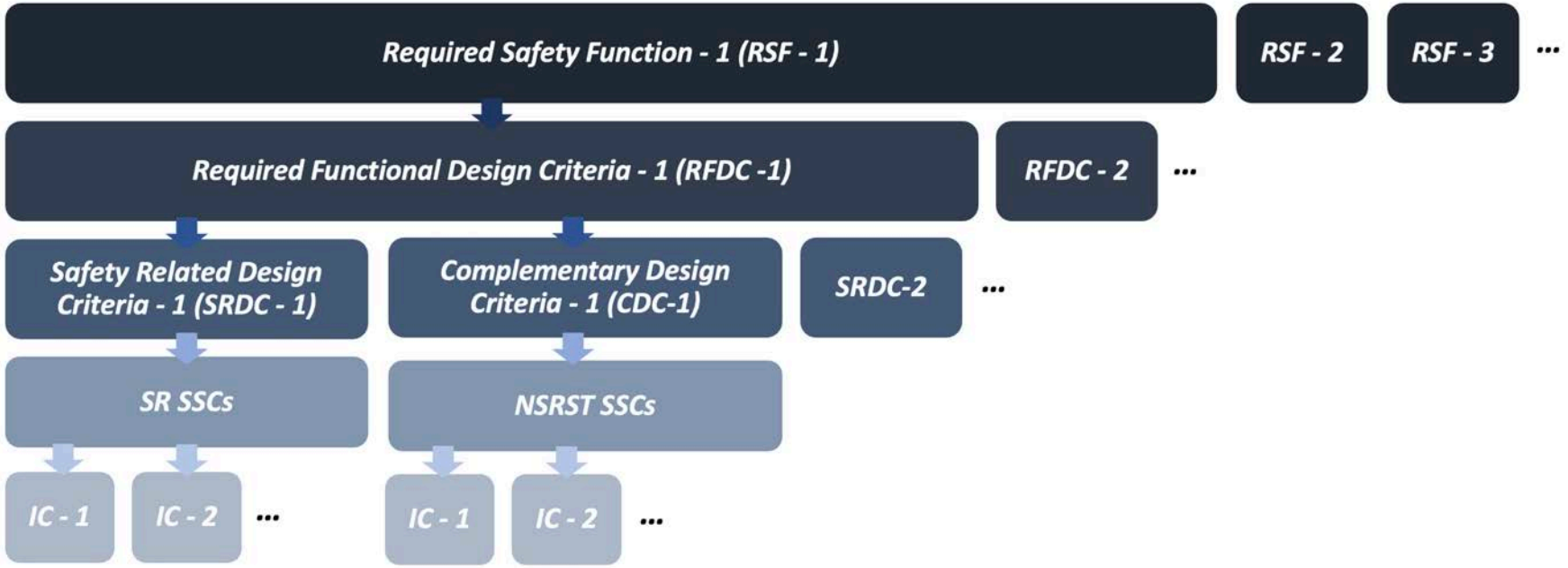
EMERGENCY PLAN: ECLs

- **Emergency Classification Levels (ECLs)**
  - The ECL definitions in NEI 99-01 and 07-01 were revised to remove reactor design-specific attributes and to align with LMP terminology and structure
  - A plant may not need all four ECLs depending on the characteristics of the derived LBEs. For example, a general emergency level may not be needed if no LBEs lead to offsite doses exceeding the PAGs

Level	Technology-inclusive Description
Notification of Unusual Event	Events are in progress or have occurred which indicate a potential degradation to a capability to perform a RSF, or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of capabilities providing RSFs occurs.
Alert	Events are in progress or have occurred which involve an actual or potential substantial degradation in the capability to perform a RSF or a security event that involves probable life-threatening risk to site personnel or damage to safety significant SSCs because of hostile action. Any radionuclide releases are expected to be limited to small fractions of the EPA PAG exposure levels.
Site Area Emergency	Events are in progress or have occurred which involve actual or likely failure of SSCs, or the capability, to perform a RSF or hostile action that results in intentional damage or malicious acts; 1. toward site personnel or equipment that could lead to the actual or likely failure or; 2. that prevent effective access to, equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA PAG exposure levels beyond the site boundary.
General Emergency	Events are in progress or have occurred which result in the failure to perform a RSF and involve actual or imminent release of radioactive material that would be reasonably expected to exceed EPA PAG exposure levels offsite. This includes degradation resulting from hostile actions.

EMERGENCY PLAN: IEs AND EALs

- **Initiating Conditions and Emergency Action Levels**
  - Within LMP, required safety functions (RSFs) are discretized into different levels of design criteria for SR and non-safety related with special treatment (NSRST) SSCs.
  - This structure is leveraged to identify monitoring attributes for initiating conditions into different emergency action levels for specific LBEs. For example, monitoring pump performance levels as part of a loss-of-flow LBE that could lead to eventual radionuclide release.



EMERGENCY PLAN: HAZARDS ANALYSIS

- **Hazards Analysis**
  - §50.160(b)(2) requires a hazard analysis of any contiguous or nearby facilities, including any credible hazards that could adversely impact the implementation of the emergency plan.
  - The developed approach outlines three types of scenarios to be considered:

External hazard:

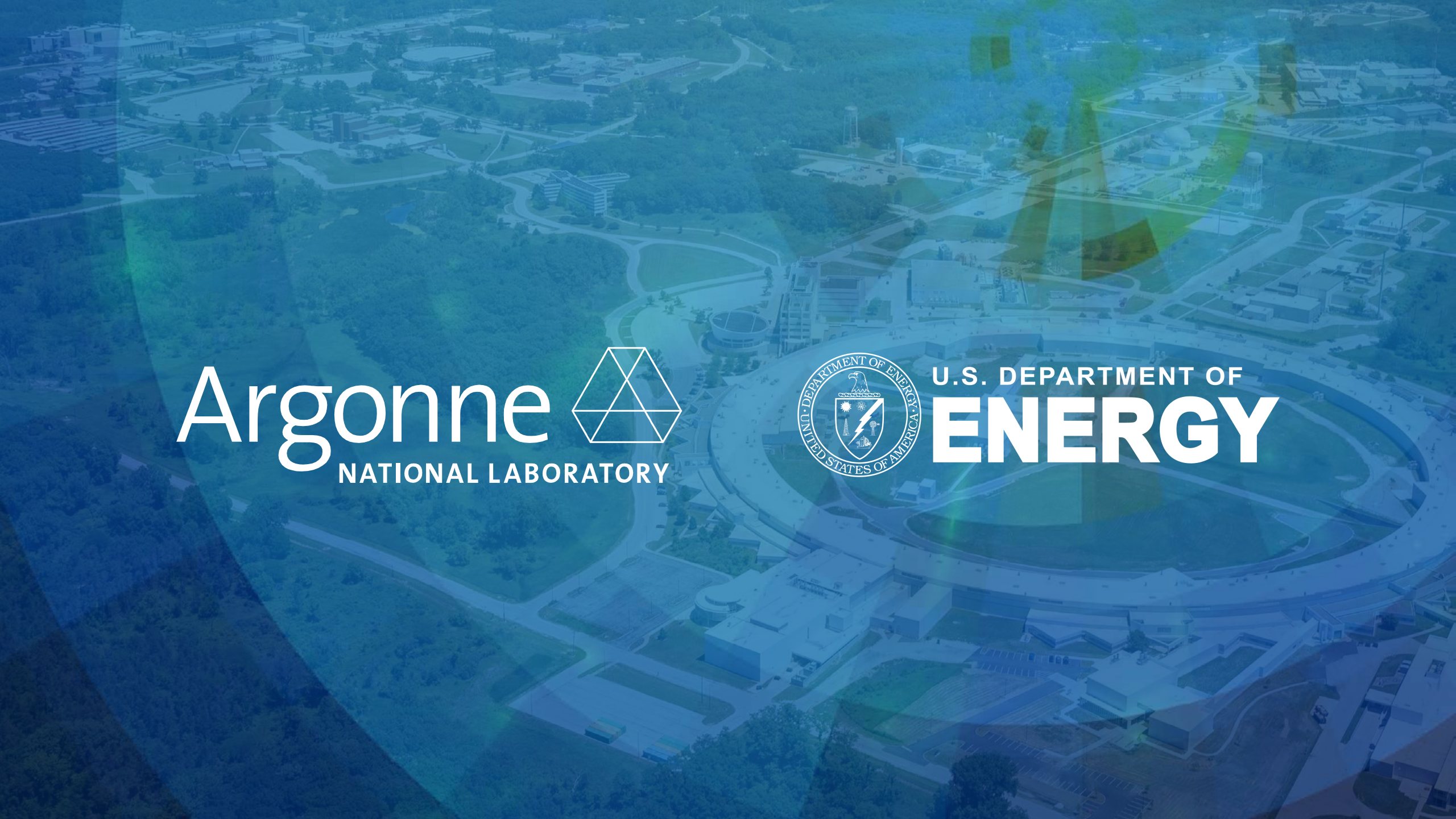
- An external hazard, such as natural phenomena, impacts the nuclear plant and the co-located/nearby facility simultaneously.
- Example: A seismic event that results in damage at the nuclear plant and the release of toxic material from a co-located/nearby chemical facility.

Nuclear plant event initiated by an event at the contiguous/nearby facility:

- An event at the co-located/nearby facility and the resulting hazard causes a condition at the nuclear plant that may jeopardize RSF performance (i.e., result in an EAL threshold exceedance).
- Example: The release of toxic gas for a co-located/nearby chemical facility impacts the operation of the nuclear plant.

Event at the contiguous/nearby facility initiated by a nuclear plant event:

- An event at the nuclear power plant impacts a co-located/nearby facility and results in an additional hazard.
- Example: A release of radioactive material from the nuclear plant results in operational disruptions at a co-located/nearby chemical facility and the release of toxic gases.


Argonne
NATIONAL LABORATORY
U.S. DEPARTMENT OF
ENERGY

LUNCH BREAK

MEETING WILL RESUME AT 1:00 PM EDT

Microsoft Teams Meeting

Bridge line: 301-576-2978

Conference ID: 425 132 082#

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

ADVANCE Act Congressional Report on Environmental Reviews of Nuclear Reactor Applications (#ADVANCENRC)

Lance Rakovan
Senior Environmental Project Manager

Ted Smith
Branch Chief

ADVANCE Act

- On 7/9/2024, the president signed into law the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act – “bipartisan legislation to provide a major boost to the future of nuclear energy in America”
- Section 506 – Modernization of Nuclear Reactor Environmental Reviews

ADVANCE Act Section 506

Under Section 506 of the ADVANCE Act, Congress has directed the NRC with developing a report on the agency's efforts to facilitate efficient, timely, and predictable environmental reviews of nuclear reactor applications under section 103 of the Atomic Energy Act (AEA) of 1954 (42 U.S.C. 2133), including expanded use of categorical exclusions, environmental assessments, and generic environmental impact statements

ADVANCE Act Section 506

The NRC staff, led by the NRC's Environmental Center of Expertise (ECOE), will leverage the Fiscal Responsibility Act (FRA) amendments to the National Environmental Policy Act (NEPA) and the ADVANCE Act itself to enhance ongoing efforts to improve environmental review cost, timeliness, and predictability

ADVANCE Act Section 506

The scope of the NRC's report will include modernization of environmental reviews for all types of nuclear reactor applications (e.g., advanced reactors, license renewals, power uprate amendments, etc.) but will not include other licensing actions unrelated to AEA Section 103 nuclear reactor applications

ADVANCE Act Section 506

- Section 506 of the Act contains several items that NRC has been directed to consider as part of its report
- The NRC staff is examining lessons learned from recent environmental reviews across business lines, as well as stakeholder feedback, to achieve efficiencies beyond the new NEPA requirements

Public Meeting

- The NRC staff is seeking input from external stakeholders as it prepares a report to Congress on efforts to facilitate efficient, timely, and predictable environmental reviews for nuclear reactor applications
- Wednesday, September 25th at 1:00 pm ET
- Meeting details: ML24247A101 or https://www.nrc.gov/pmns/mtg?do=details&Code=20241112

Report Contacts

- Lance Rakovan, Congressional Report Lead, Office of Nuclear Material Safety and Safeguards (NMSS)
- Sarah Lopas, Back-up Lead, NMSS
- Ted Smith, Chief, Environmental Technical Review Branch 2, NMSS

Next Steps

NRC will

- Issue a meeting summary for the public meeting
- Analyze the input received during the meeting to inform the report to Congress
- Issue the report to Congress by 1/5/2025

ADVANCE Act Advanced Reactor Topics

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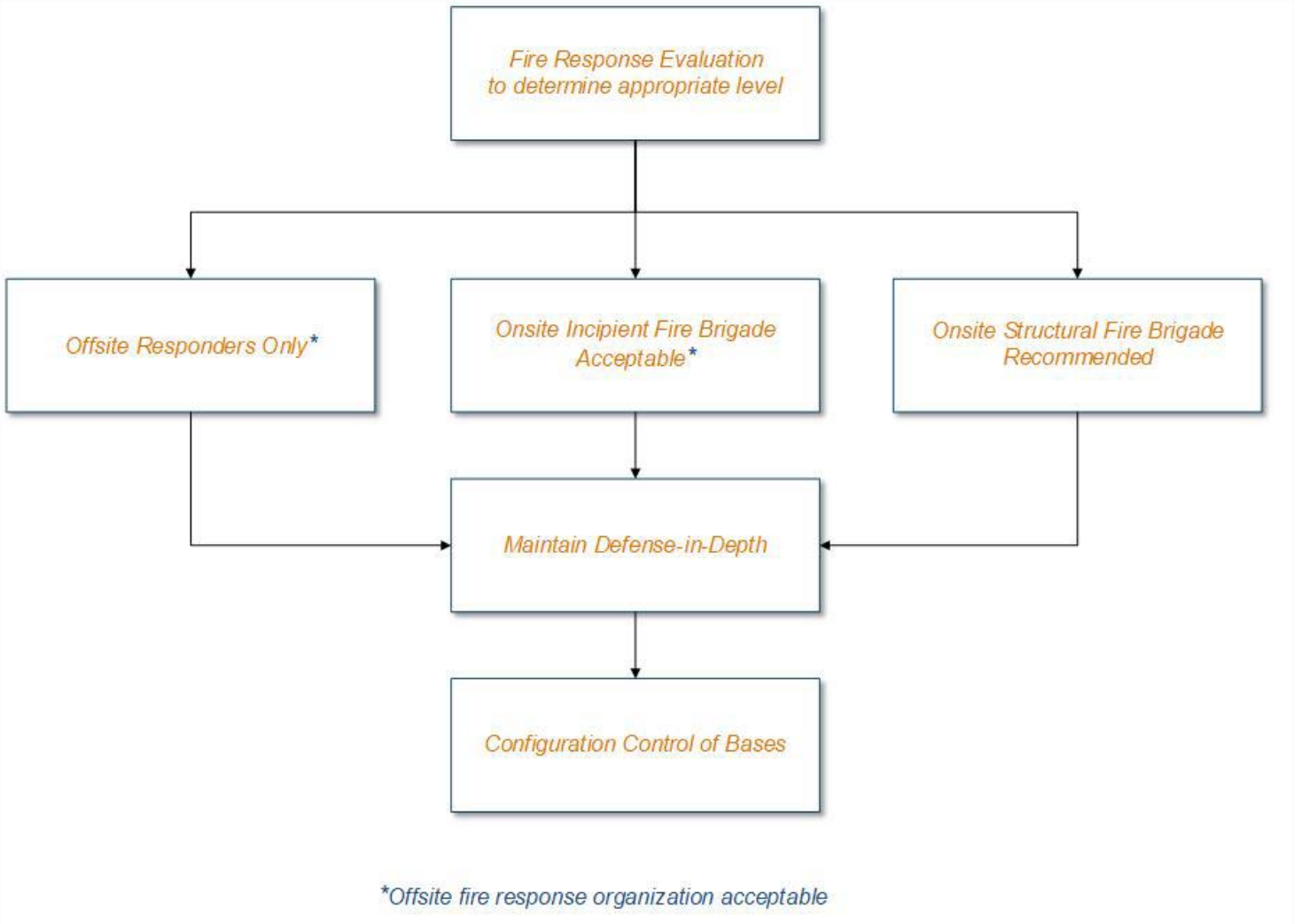
ADVANCE Act Advanced Reactor Topics

- Sec. 203, "Licensing considerations relating to use of nuclear energy for nonelectric applications"
- Sec. 206, "Regulatory issues for nuclear facilities at brownfield sites"
- Sec. 207, "Combined license review procedures"
- Sec. 208, "Regulatory requirements for micro-reactors"
- Sec. 401, "Report on advanced methods of manufacturing and construction for nuclear energy projects"

Fire Brigade Staffing

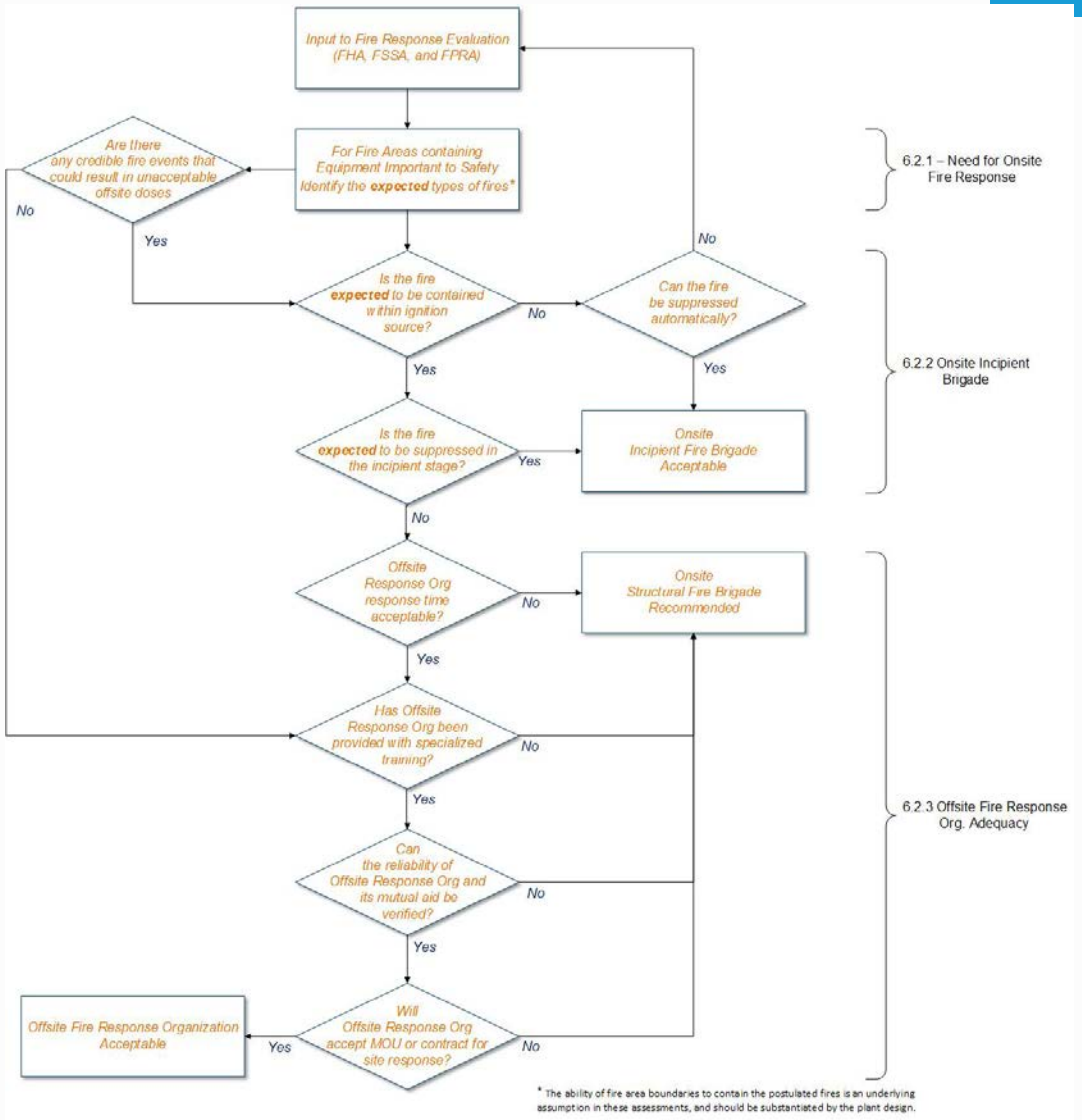
- Overview of Technical Report
  - Background
  - Regulation and guidance document review
  - Regulatory submittals and approval process
  - Advancements in technology and analysis techniques
  - Risk-informed, performance-based fire response evaluation process

Overview of RI-PB Fire Response Evaluation



Fire Response Evaluation Process

- Plant specific input:
  - Fire Safe Shutdown Analysis
  - Fire PRA (if performed)
  - FHA
- Process
  - Address need for onsite response
  - Address potential for onsite incipient brigade
  - Assess the acceptability of the offsite response capability



Offsite Responders Only

- Micro-reactors are more like research and test reactors as recognized in the Supplementary Information in the publication of the final rule for Emergency Preparedness for Small Modular Reactors and Other New Technologies. Emergency Planning Zone (EPZ) criteria is outlined in 10 CFR 50.33(g)(2)(i)
  - Any fire-induced damage will not result in a public dose to exceed 10 mSv (1 rem) total effective dose equivalent at the site boundary for 96 hours, and
  - Pre-determined, prompt protective measures are established.
- Ensure adequacy of offsite responders

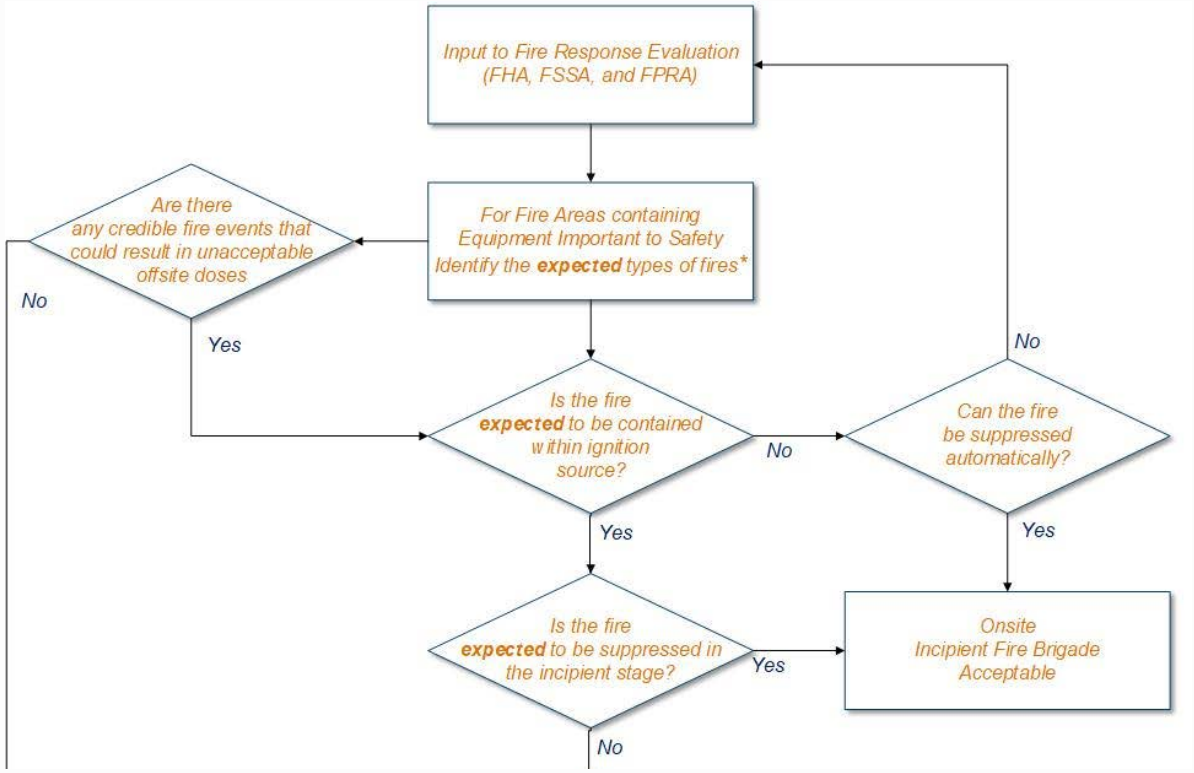
Onsite Incipient Fire Brigade

- The incipient stage fire is defined in NFPA 600 as

  A fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe, or small hose systems without the need for protective clothing or breathing apparatus.

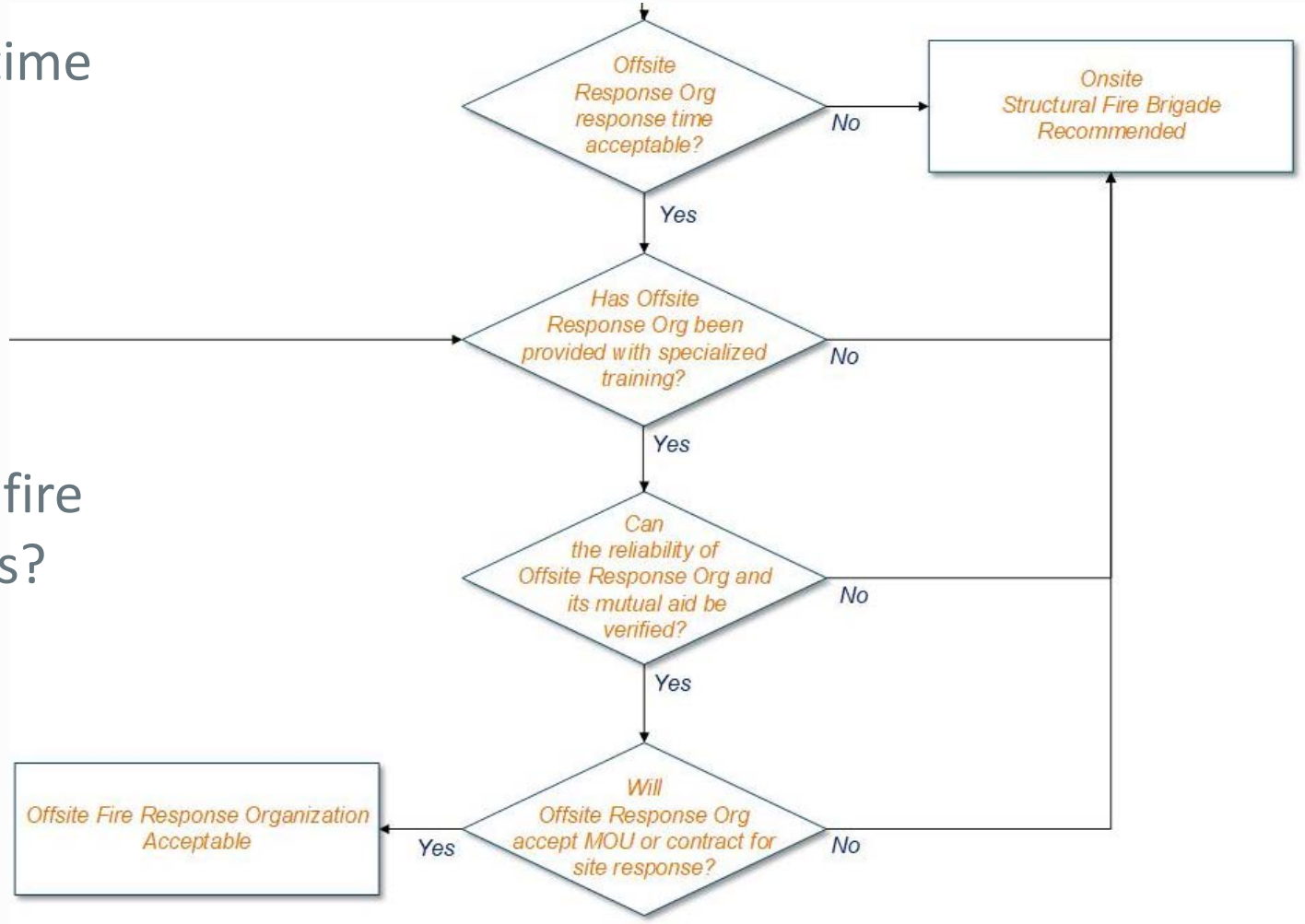
Onsite Incipient Fire Brigade

- The types of fires expected in the fire areas of concern.
- Whether the types of fire can propagate beyond the ignition source.
- Is the fire expected to be identified in the incipient stage?
- If the fire is expected to progress, evaluate the detection and/or automatic suppression to address uncertainty.



Acceptability of Offsite Responders

- Identify the desired fire response time
- What is the distance of the facility from response organization and response time?
- Does the postulated fires require specialized training beyond offsite fire response organization's capabilities?
- Can the reliability of the offsite responders be verified?
- MOU to guarantee response and service level?



Maintain Basis for Acceptability

- The site fire protection program plan should identify:
  - An individual with overall responsibility for the fire protection program.
  - An individual with the necessary level of understanding of the plant be available to oversee the fire response.
  - A process for maintaining configuration control of the fire protection program.
  - A method for ongoing demonstration of capability of the offsite fire response to effectively respond to fire events.

NEI 22-04/ISO-9001 and AR Codes and Standards Status Update

NRC Advanced Reactor Stakeholder Meeting

Mark Richter
Technical Advisor
Nuclear Energy Institute

NUCLEAR ENERGY INSTITUTE

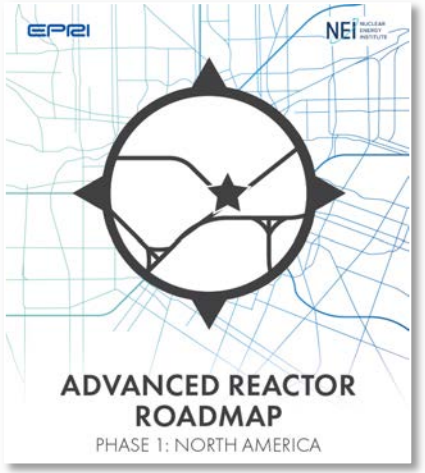
September 18, 2024

NEI/EPRI North American Advanced Reactor Roadmap Assigned Actions to ARCSC

- **TR-CS-01: Alignment and Improvement of Codes and Standards ACTION for 2024: Identify additional gaps in, and any adjusted timelines for, advanced reactor codes and standards**

  - ✓ Consolidate and update prior advanced reactor codes and standards gap analysis
  - ✓ Define development timelines for commercial relevance
  - ✓ Prioritize gaps and associated actions
  - ✓ Secure resources to address gaps in and timelines for advanced reactor codes and standards development

- Action Owners: ARCSC, SDOs, NEI, EPRI, AR Vendors
- **Need Date: Gaps identified by end of 2024**

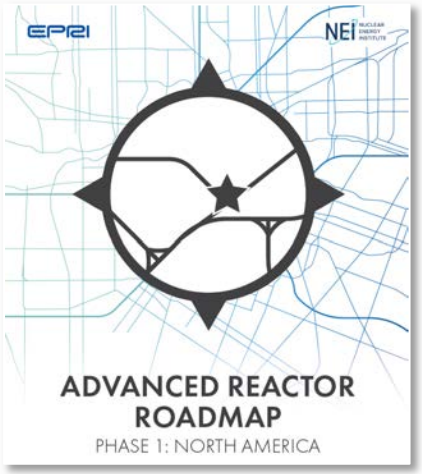


NEI/EPRI North American Advanced Reactor Roadmap Assigned Actions to ARCSC

- **TR-CS-02 Risk-Informed and Performance-Based Approach**

  - ✓ Demonstrate Risk-Informed and Performance-Based Approach Standard
  - ✓ Develop and execute a pilot project that applies Risk-Informed and Performance-Based (RIPB) methods in development of a new AR standard jointly with US and Canada-based SDOs (potential cross-cut with International Harmonization actions).

- Action Owners: ARCSC
- **Need Date: 2025**



ARCSC Activities to Date

Fall 2022	December 1, 2022	Mar – Oct 2023	November 30, 2023	Winter/Spring 2024	Summer 2024
• Formation of ARCSC	• Kickoff Workshop	• Charter Developed • Process Developed • Collection of relevant standards • Survey initiated • Survey Data Collected	• Annual Workshop to share preliminary survey results	• ARCSC Website deployed in February https://arcsc.nei.org/ • SDOs received Survey results and evaluate survey data.	• Survey feedback from SDO members collected including identification of research needs.

Process to Translate SDO Committee Responses of Master Spreadsheet

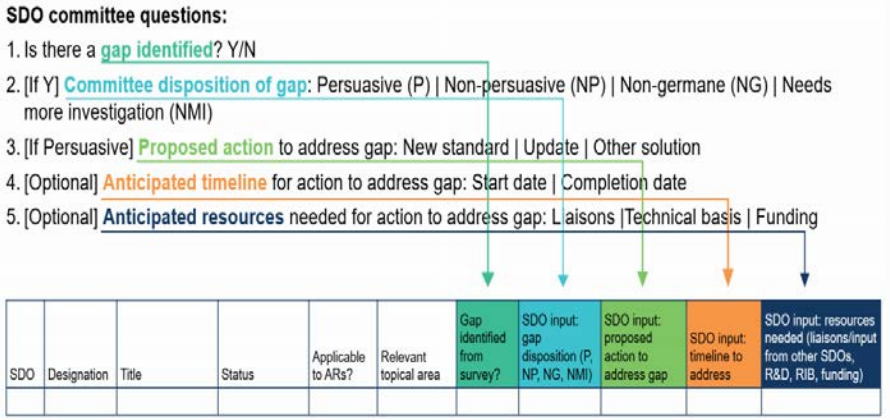
SDO committee questions:

1. Is there a **gap identified**? Y/N
2. [If Y] **Committee disposition of gap**: Persuasive (P) | Non-persuasive (NP) | Non-germane (NG) | Needs more investigation (NMI)
3. [If Persuasive] **Proposed action** to address gap: New standard | Update | Other solution
4. [Optional] **Anticipated timeline** for action to address gap: Start date | Completion date
5. [Optional] **Anticipated resources** needed for action to address gap: Liaisons |Technical basis | Funding

SDO	Designation	Title	Status	Applicable to ARs?	Relevant topical area	Gap identified from survey?	SDO input: gap disposition (P, NP, NG, NMI)	SDO input: proposed action to address gap	SDO input: timeline to address	SDO input: resources needed (liaisons/input from other SDOs, R&D, RIB, funding)

ASME Priorities from ARCSC Gap Assessment Survey

- BPV Section III, Division 1: Seismic Analysis
- BPV Section III, Division 5: High Temperature Materials for SMRs
- BPV Section III, Division 5: Graphite Materials
- BPV Section XI, Division 2: Inspection Protocols for Graphite and RIM for Sodium Fast Reactor
- Operations & Maintenance Code: Update for advanced reactors, including non-LWRs
- Qualification of Mechanical Equipment Standard: Update for advanced reactors, including non-LWRs and risk-informed qualification processes
- Nuclear Quality Assurance: Considerations for graded QA applications



Gap Analysis Example – ASME OM Code

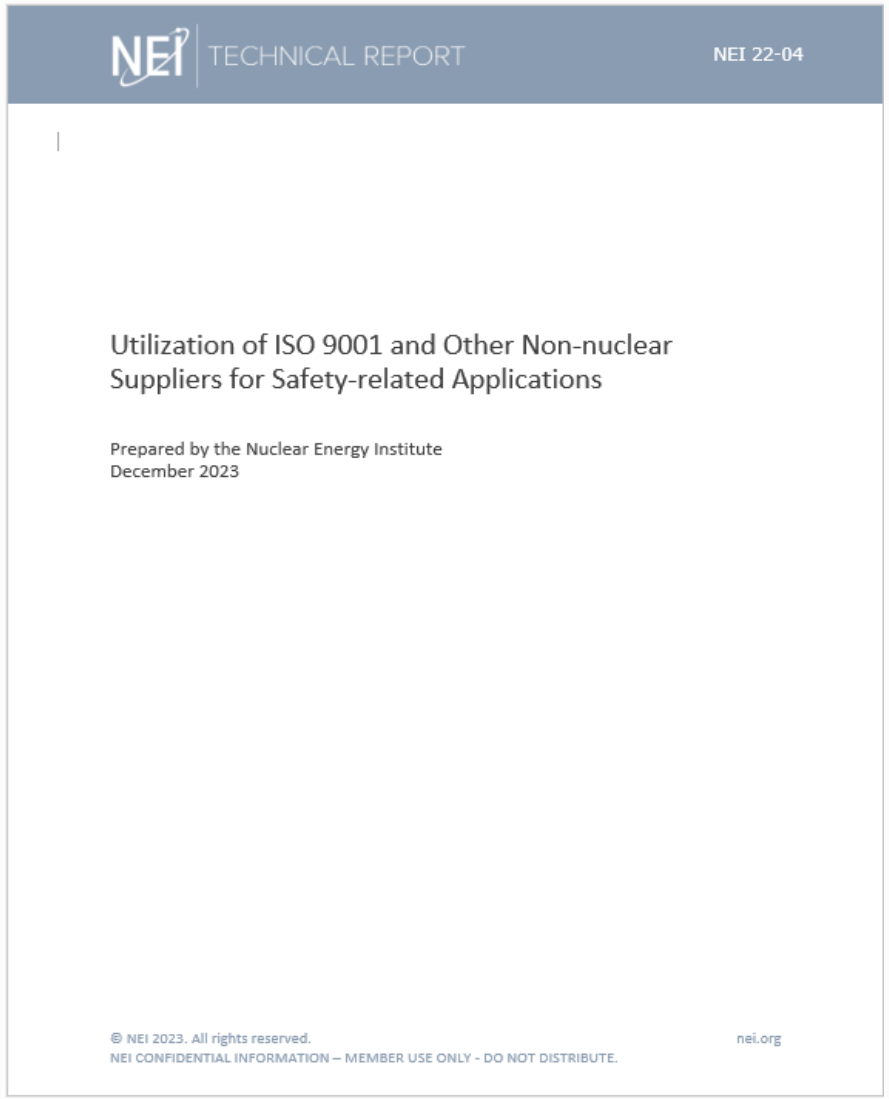
SDO	Document	Title	Gap Description	Proposed Action	Resources Needed	Priority
ASME	OM Code	Operations & Maintenance or Nuclear Power Plants	Language in currently available OM Code still specifies water or LWR applications. OM-2's release and subsequent NRC endorsement will fill all gaps. OM-2 Rules for Inservice Testing Requirements for Pumps, Valves, and Dynamic Restraints at Nuclear Facilities	OM 2 is being developed to address all types of advanced reactors. The ASME Operation and Maintenance (OM) Code Committee is presently addressing gaps between the existing fleet and new reactors. The new OM Code seeks to incorporate component level testing and inspection requirements for pumps, snubbers, and valves that are compatible with all of the new reactor designs represented by stakeholders in the ASME OM Code New Reactor Subcommittee. The present effort additionally seeks to align the QME and the OM Codes in a way that assists the regulatory authority and owners in the USA with the transition from construction to operation.	NRC endorsement	High

ARCSC Website – Launched in February 2024

http://arcsc.nei.org

NEI 22-04

- Builds on NRC's SECY-03-0117 conclusion that ISO-9001 offers viable path to meet Appendix B
- Aligns with North American Advanced Reactor Roadmap supply chain action
- NEI guidance document primarily for the purchaser/customer use
- Content
  - Process description for implementation
  - Purchaser performs screening process for potential suppliers
  - Identifies differences in requirements for ISO-9001 compliance with Appendix B
  - Purchaser identifies supplier actions to address differences in requirements and achieve Appendix B compliance
  - Part 21 compliance remains with the purchaser
- Submit to NRC for review and endorsement by end of Q2 2024.


NEI TECHNICAL REPORT NEI 22-04

Utilization of ISO 9001 and Other Non-nuclear Suppliers for Safety-related Applications

Prepared by the Nuclear Energy Institute
December 2023

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Why focus on ISO 9001?

- Goal: Expand the existing community of nuclear suppliers
  - ISO-9001 focus is about **meeting customers requirements** (Appendix B)
  - ISO 9001 adaptable to any industry with programmatic rigor commensurate with industry demands
  - There is a significant population of suppliers with ISO 9001 programs now
  - Many ISO 9001 suppliers have robust QA programs and supply reliable products of high quality to other industries
  - Nuclear suppliers already use ISO 9001 suppliers through commercial grade dedication
  - U.S. suppliers qualified to globally accepted quality assurance programs will be more competitive

What's Next?

- Implement NEI Policy Process to seek NEI member executive leadership insights and inform the final version for submittal
- Submit to NRC for review and endorsement (Q2 2025)
- Develop a long-term strategy for using ISO-9001, ISO-19443 or other commercial programs which may include:
  - Implementation of pilot exercises (Evaluating component performance by making an identical part from both augmented ISO-9001and NQA-1 Appendix B programs to validate that they are equivalent)
  - Future expansion of NEI 22-04 (e.g., taking credit for the ISO accreditation process to eliminate the need for purchaser audits/surveys)
  - Develop Rulemaking accepting ISO-9001(and/or ISO-19443) directly for use for safety related SSCs (Long-term aspirational goal)

Future – Design Once, Build Everywhere

- Commercial quality programs as well as codes and standards are valuable aids in growing an efficient, competitive supply chain
- Global acceptance of codes and standards along with commercial quality programs that address advanced reactor needs will support design, licensing, procurement and construction
- The nexus of commercial quality programs and risk-informed codes and standards is now evident, for example, by emergent needs to construct civil structures at nuclear facilities commensurate with actual safety risk, or new advanced manufacturing methods
- Design once and build everywhere is our aspirational goal!

Questions?

mar@nei.org

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Public Comments

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Closing Remarks

- October 30, 2024, Periodic Advanced Reactor Stakeholder Public Meeting

Advanced Reactor Program