Risk-Informed Showcase Public Meeting

February 19, 2026

Opening Remarks

- Shana Helton, Director, Division of Fuel Management, Office of Nuclear Material Safety and Safeguards

- Rod McCullum, Senior Director, Used Fuel and Decommissioning, Nuclear Energy Institute

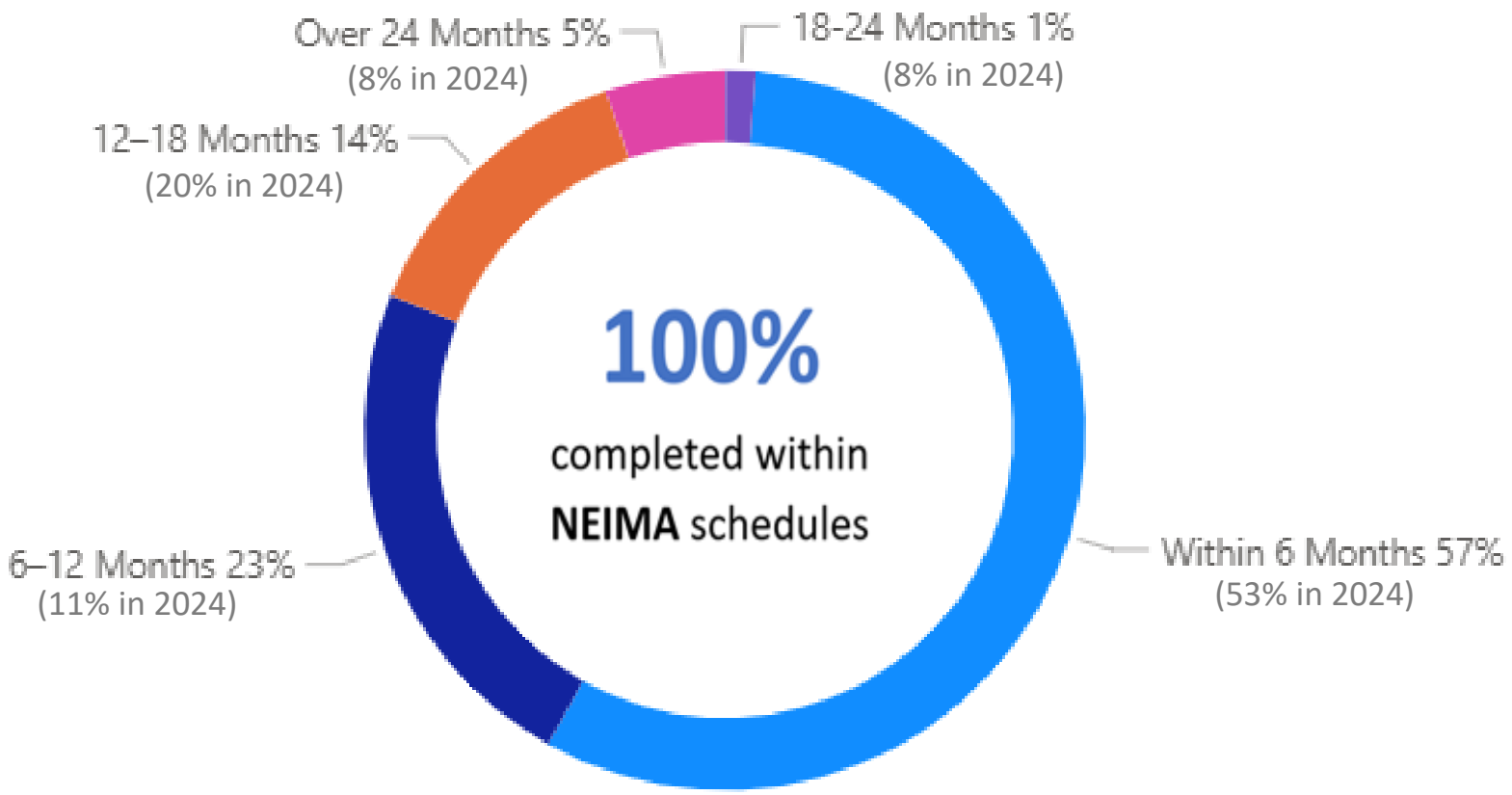
Meeting the Moment

- EO 14300 and ADVANCE Act
  - Effectiveness, Efficiency, and Timeliness Initiatives that Support Unleashing American Energy
  - Updated NEIMA licensing milestones
- NMSS Licensing Efficiency Expectations
  - Focus on safety
  - Reduce schedule and cost
- OEDO Procedure 0235: Driving Regulatory Decisions Through More Effective Communications
  - Facilitate timely and efficient resolution of regulatory activities

Licensing Progress: 2025 year in review

82
Licensing Actions Completed*

62
Tracked Under NEIMA**



*3 Licensing action were completed under the new EO 14300 metrics
**Nuclear Energy Innovation and Modernization Act

Efficient Oversight Achieved by Leveraging Risk Insights

Eucherius Rosario

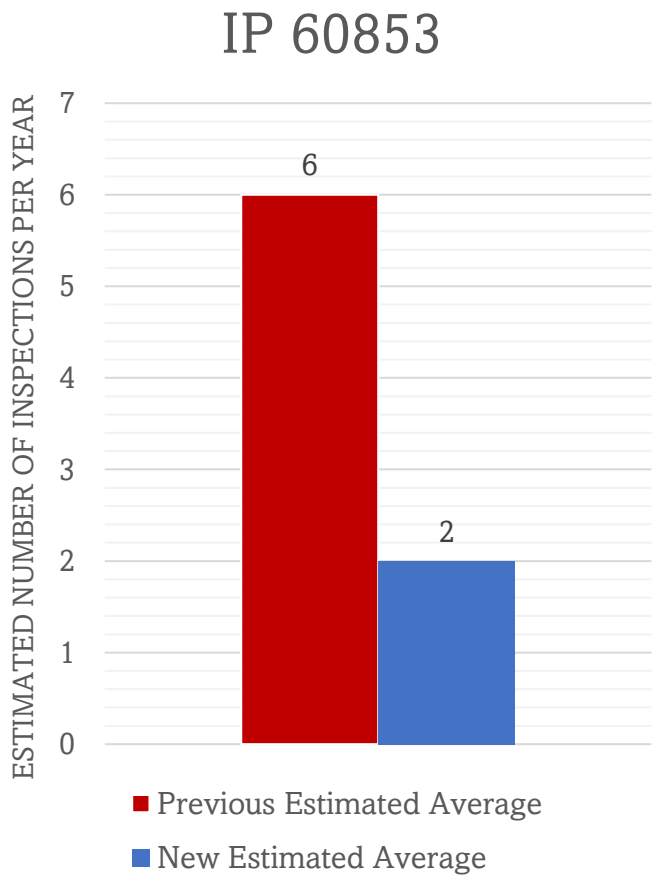
Storage & Transportation Safety Inspector
Inspection and Oversight Branch
Division of Fuel Management

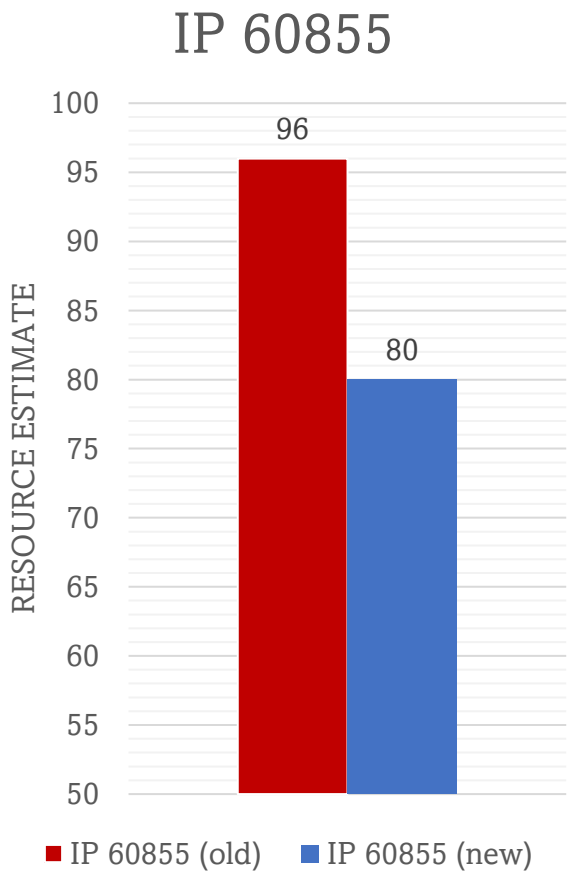
Modernizing the Spent Fuel Storage & Transportation (SFST) Inspection Program

- Independent Spent Fuel Storage Installation (ISFSI) Enhancement Initiative
  - Inspection Manual Chapter (IMC 2690) Overhaul
  - Risk-informed, performance-based inspection program
- Focusing on Safety
  - Graded approach to important to safety (ITS) structures, systems, and components (SSCs)
  - Operating experience
- ADVANCE Act Section 507
  - NRC Report to Congress (ML25077A251)

Risk-Informing Inspection Procedures (IPs)

IP Number & Title	Estimated Reduction (hours/year)	Potential Savings
IP 60853, "Onsite Fabrication of Components and Construction of an ISFSI"	880	Estimated 4 less not ITS inspections (up to 13% reduction in direct inspection hours per year)
IP 60855, "Operation of an ISFSI"	640	Estimated 17% resources reduction per inspection

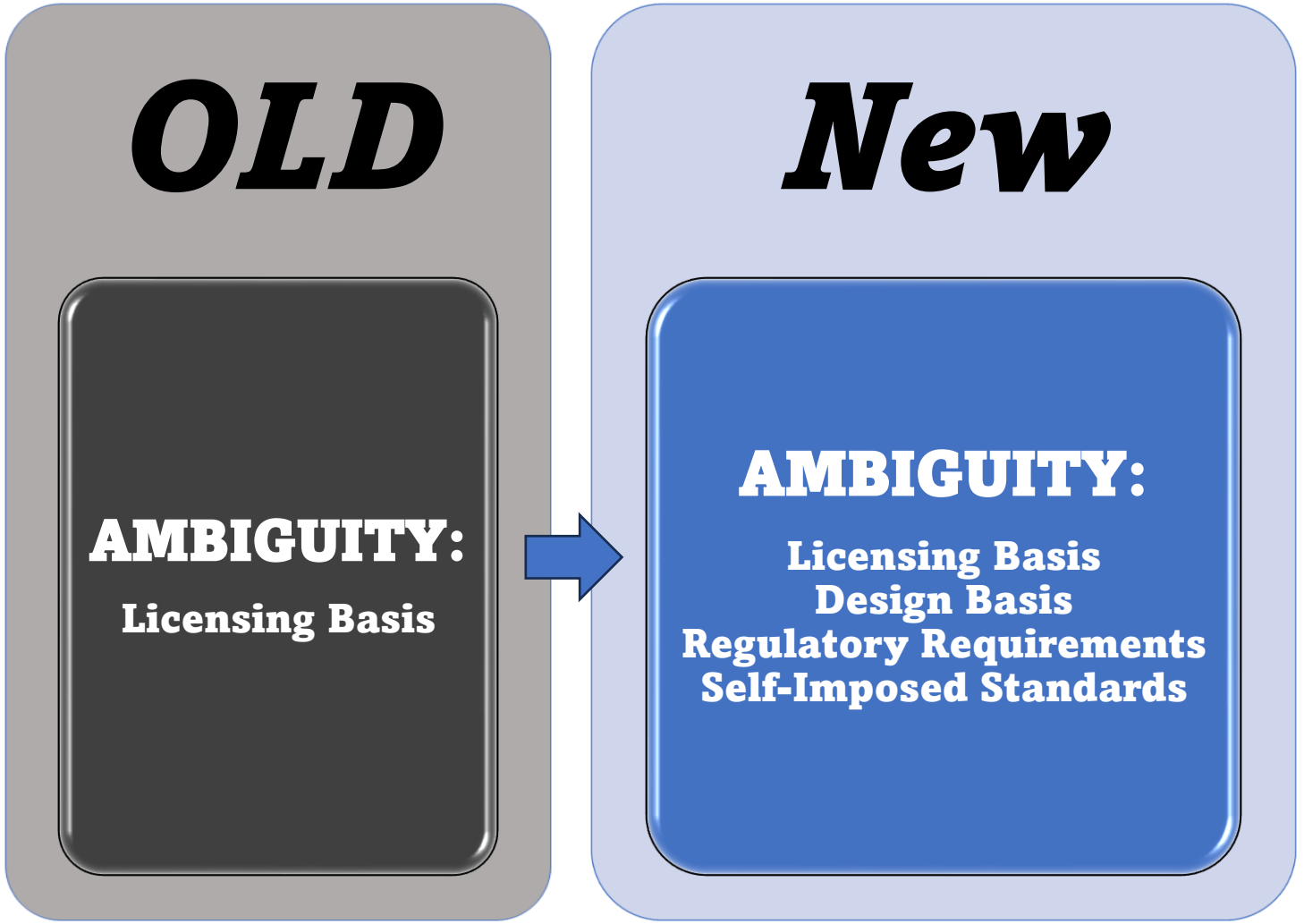




VLSSIR, Expanded: Faster Screens, Smarter Focus

Revised IMC 0610 App G, "Screening and Documentation of **V**ery **L**ow **S**afety **S**ignificance **I**ssue **R**esolution (**VLSSIR**) Process"

- Tool available for inspectors that is expected to:
  - Promote inspection completion timeliness
  - Reinforce safety focus
  - Improve alignment of resources (16-hour backstop)



Smarter Enforcement: Aim Where the Fix Lives

- Interim Enforcement Policy (IEP) 9.4
  - "Enforcement Discretion for General Licensee Adoption of Certificate of Compliance Holder-Generated Changes" (ML25224A182)
- Clarifies overlapping responsibilities
- Focuses enforcement on entity best positioned to act

In-Progress Activities & Measuring Effectiveness

- SFST integration of LIC-504, “Integrated risk-informed decision-making process for emergent issues”
- Streamlining inspection reports
- Established standard on follow-up issues involving very low safety or security significant issues and inspection timeliness
- Aligning with the Reactor Oversight Program on similar ADVANCE Act Section 507 actions

Key Takeaways: What This Means for Stakeholders

Safety mission unchanged

Oversight focused where risk is greatest

Clearer, more predictable inspection and enforcement

Continued engagement and transparency

Using the Risk Tool to Streamline Licensing Reviews of Dry Cask Storage Systems

Alexis Sotomayor-Rivera
Nuclear Engineer
Nuclear Analysis and Risk Assessment Branch
Division of Fuel Management

The Risk Tool

Introduces a risk-informed framework that helps prioritize review actions based on the potential risks associated with license action requests, such as amendments.

New guidance scales the level of effort and depth of licensing review by focusing on safety functions and risk significance.

Assists in right-sizing approach to enforcement

Right-Sizing Resource Estimates

Review Considerations	Limited Review (40-80 hours)	Detailed Review (80-140 hours)	Extensive review (140-180 hours)
Risk Significance	Low Risk: structure, system, component (SSC) failure unlikely to affect safety	Medium Risk: SSC failure + another failure could lead to loss of confinement, shielding or criticality	High Risk: SSC failure could directly lead to loss of confinement, shielding or criticality
Precedence	Numerous references; consistent with prior approvals	Some references; limited with prior approvals	Limited or no references; new designs
LAR Change	Small change from previous approvals	Limited change from previous approvals	Large change from previous approvals
Safety Margin	Significant	Limited	Small
Performing Confirmatory Analysis	Not necessary	May be considered	Should be conducted
Requests for Supplemental Information/Observations	Limited	Possible	Likely

Next Steps

- Add additional information to the technical bases to improve clarity
- Include risk insights on non-accident conditions (e.g., aging management)
- Incorporate knowledge learned during reviews of evolving cask designs
- Add a discussion of key assumptions used in risk evaluations
- Visualize data and group components related to a specific safety function
  (Include additional components)

Leveraging ADVANCE Act 505 and M-LEAP Risk-Informed Efficiencies

Haimanot Yilma
Senior Project Manager
Storage and Transportation Licensing Branch
Division of Fuel Management

Right-Sizing Review Scope

Implementing a graded approach for Environmental and Financial Reviews for Decommissioning Funding Plans (DFPs)

- ✓ For DFP update: Level of Effort reduction of ~**75%** per review
- ✓ **Safety** remains our **top priority**

Leveraging past decisions and risk insight to focus licensing reviews

- ✓ Identification of technical issues early in the process

Efficiency in Action: Risk-Informed Approaches That Deliver Results

Using risk to inform safety basis

- ✓ Exemption request to assess impact promptly

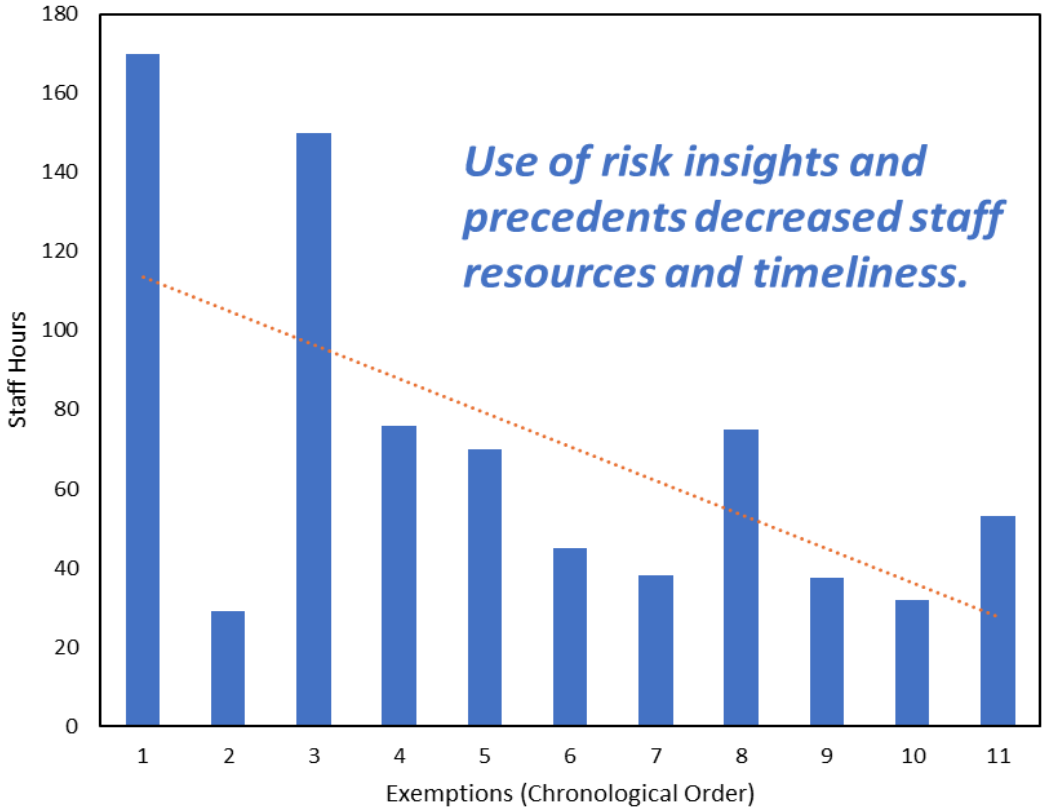
Streamlining review process

- ✓ Saving ~**11 months** and ~ **800 hrs**.

(Baseline: 2 years & ~1,300 hrs.)

Pre-Application Engagement

- ✓ ~**50%** schedule saving



Optimizing Aging Management Guidance

Darrell Dunn
Senior Materials Engineer
Materials and Structural Branch
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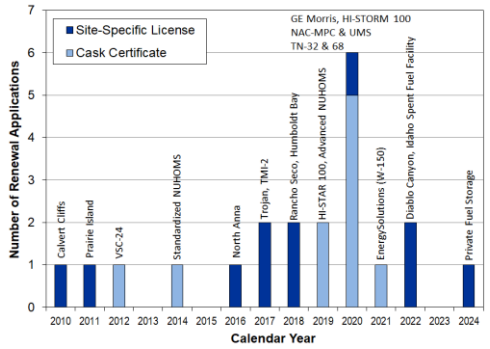
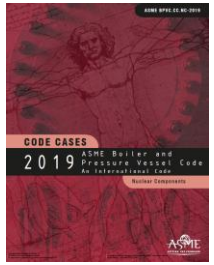
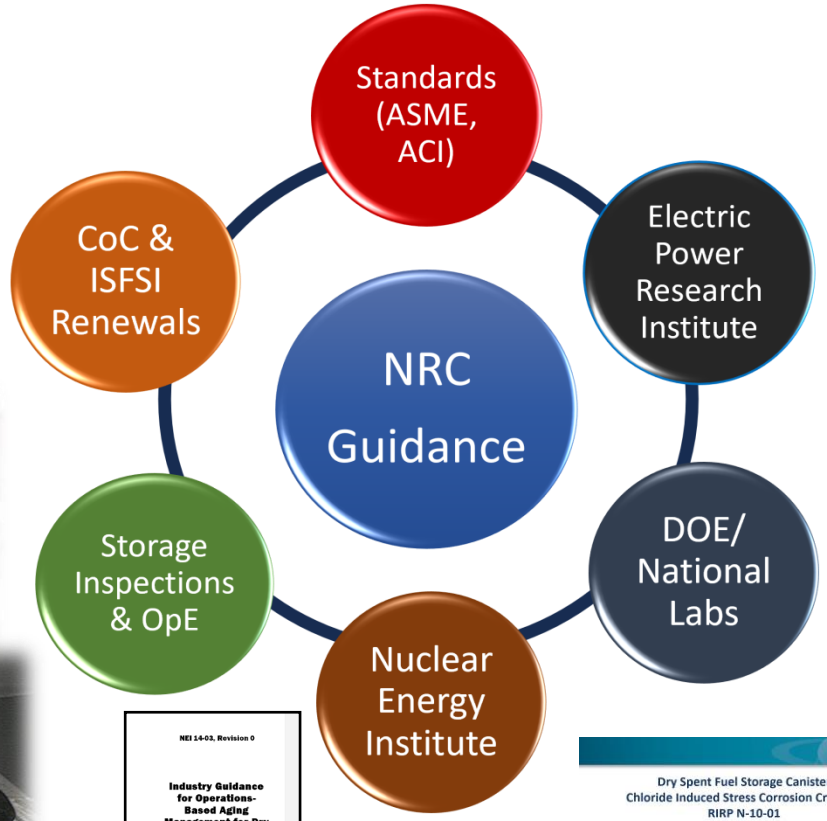
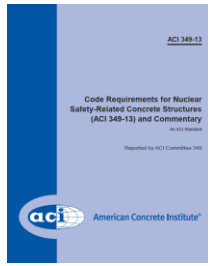
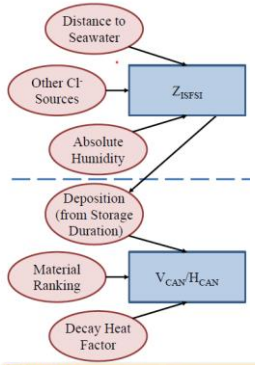
Utilize Available Information

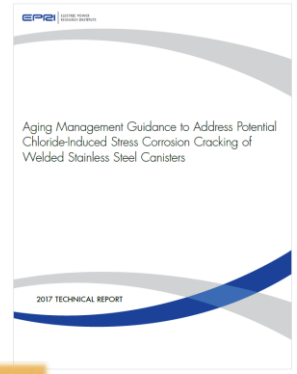


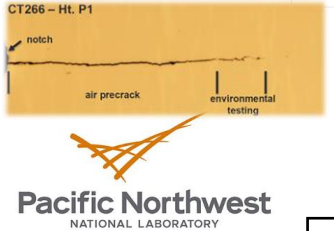


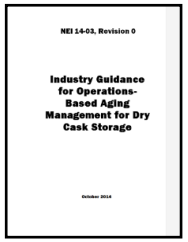


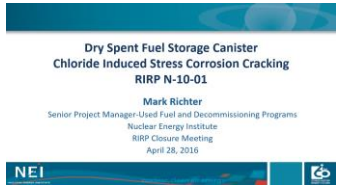


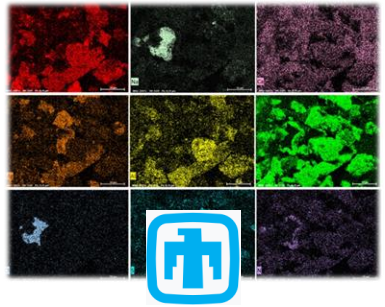


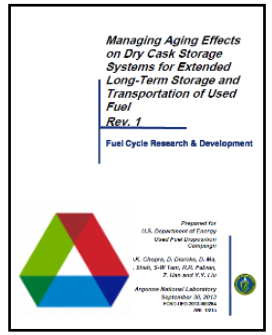






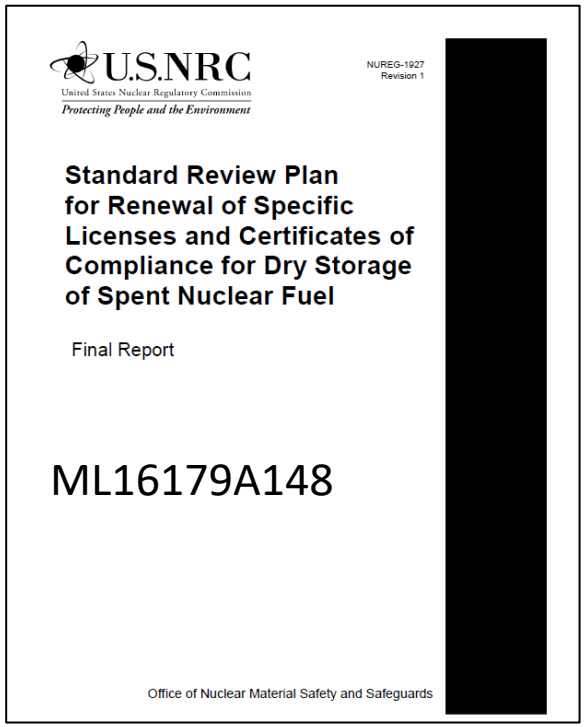




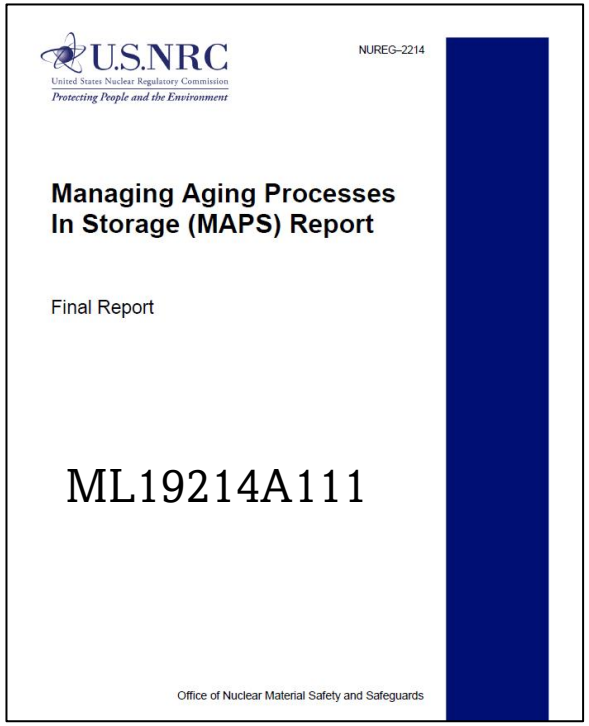


Focus on Credible Aging Mechanisms

- Renewals up to 40 years
  - Updated time limited aging analyses (TLAAs)
  - Aging management programs (AMPs) as necessary
- § 72.42(a) applicable to independent spent fuel storage installation (ISFSI) licenses
- § 72.240 applicable to dry storage system certificate of compliance (CoC)



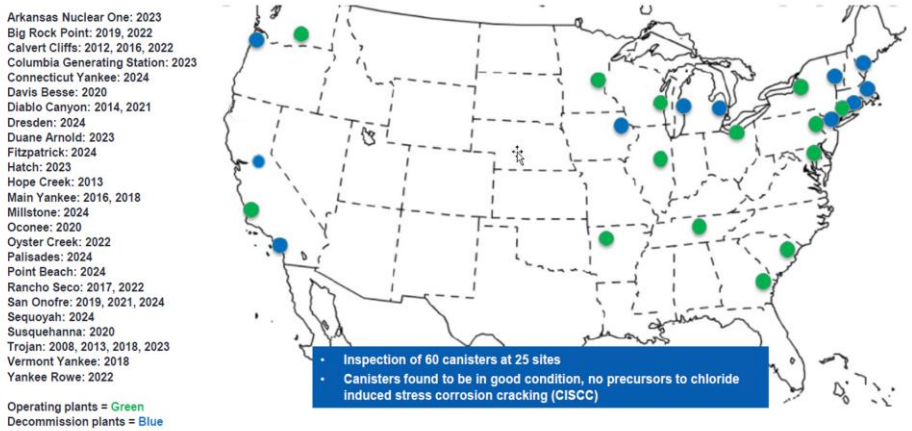
- Scoping evaluation
- Aging management review (AMR)
- TLAAs and AMPs



- Material + Environment
- Credible/noncredible aging mechanisms & effects

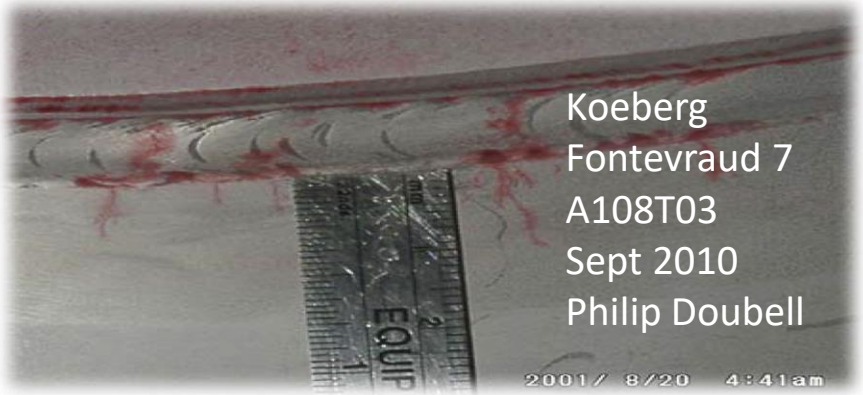
NRC Endorsement of ASME N-860

- ASME N-860 developed 2015-2020
  - EPRI–3002005371, Susceptibility Assessment Criteria for CISCC
  - Progressive inspection methodology
  - Inspection interval adjustments
- NRC Regulatory Guide (RG) 3.78
  - Additional information to risk inform inspection guidance in ASME N-860
  - CISCC operating experience for operating reactors
  - Inspection results and ISFSI locations



Jerry Stephenson, Manager, ISFSI Engineering

San Onofre Community Engagement Panel Meeting, 3/20/2025



RG 3.78 - Risk Informed Approach

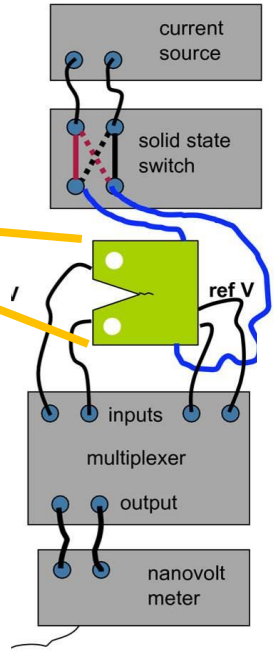
Z_{ISFSI} EPRI-3002005371	Distance to ocean (km)	Number of ISFSI sites	Max. inspection interval (yr)	N-860 or RG 3.78
1-3	**≥ 10**	**60**	**40**	**RG 3.78**
4-7	0.25 – 15	6	20	N-860
8-10	≤ 1.5	5	10	N-860

- NRC RG 3.78, February 2025 (ML24225A160)
- Absence of aggressive chloride salts
- Low, or very low, surface chloride concentrations
- Presence of inhibiting species (e.g., nitrate)
- Inspection results to date show no indications of aging

RG 3.78 Regulatory Analysis (ML24093A012)

- Relatively small cost to NRC
- Potential net benefit of $25.9M over 40 yrs

Potential Approach for Non-Inland sites



PNNL-35667
ML24212A106

- Risk assessment for CISCC
  - Measurements of CISCC growth rates
  - Probabilistic model for CISCC
  - Consequence analysis for CISCC

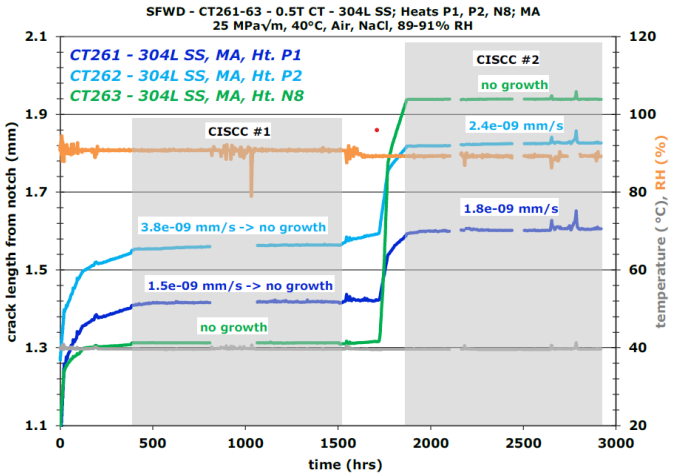


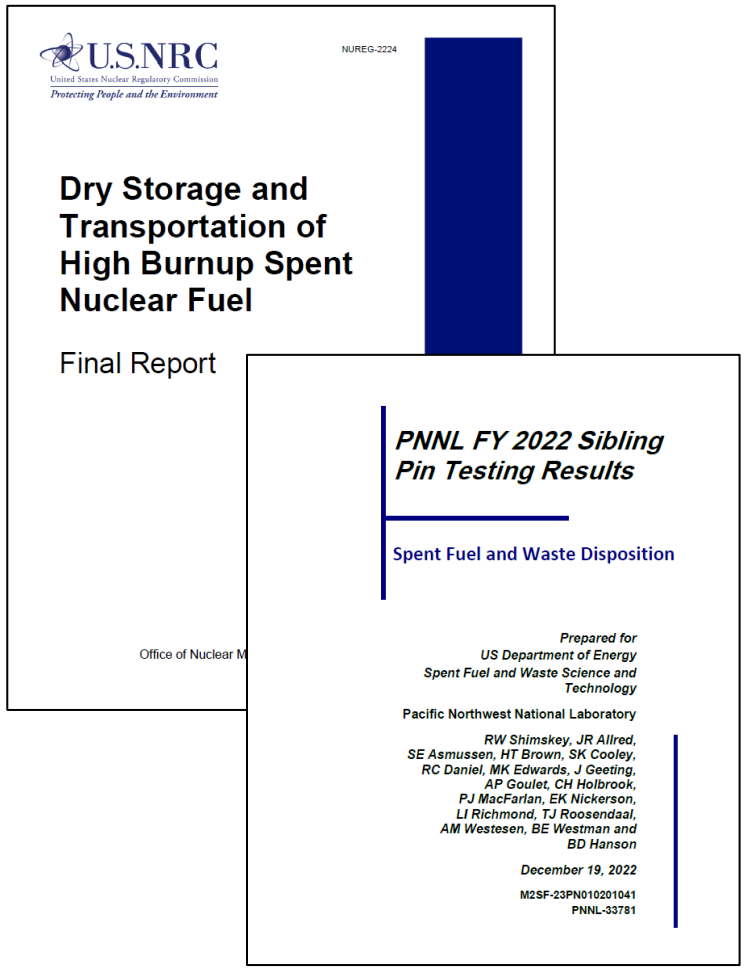
Figure 36. CISCC growth behavior of CT261-63 (one specimen each of heat P1, P2, and N8) in a 40°C deliquescent NaCl environment at ~90% RH.

Dose at controlled area boundary vs. Regulatory limits in 10 CFR Part 72

- Respirable fines
- Noble gasses
- Volatile species
- CRUD

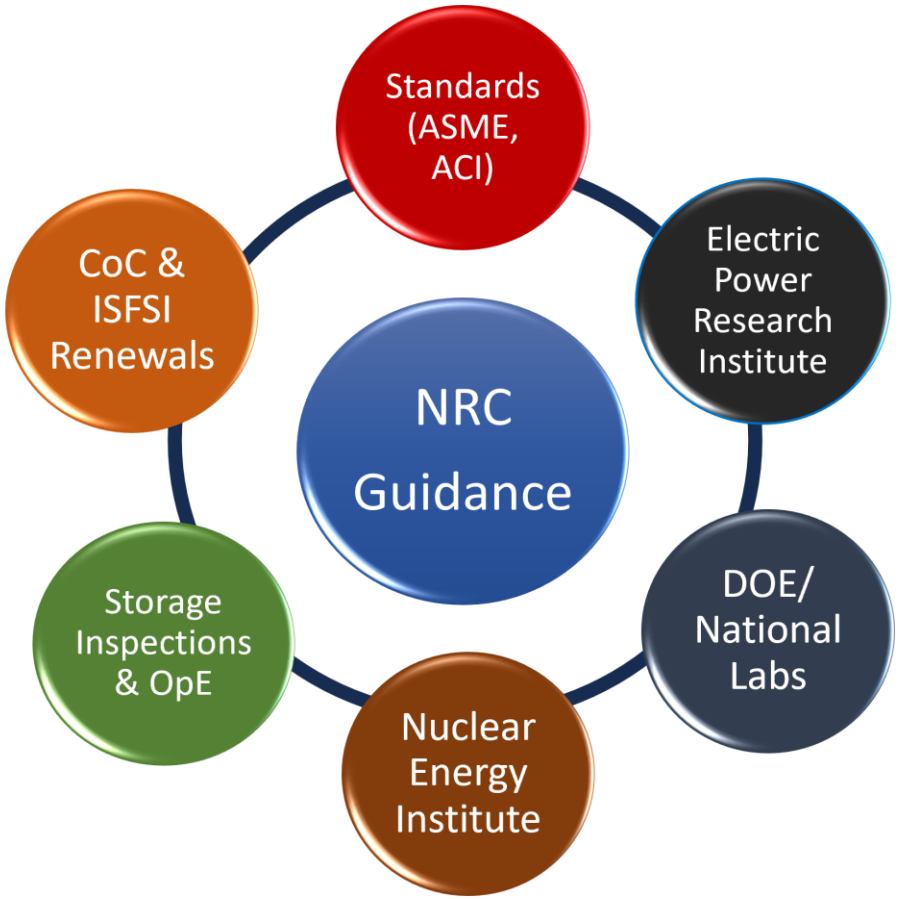
What's Next?

- Fuel Performance
  - Licensing approaches for storage and transportation
  - NUREG-2224, "Dry Storage and Transportation of High Burnup Spent Nuclear Fuel."
  - EPRI/DOE High Burnup Fuel Demonstration Cask
  - Test results from the sister rods
- Stakeholder Feedback



Going Forward

- Continue engagement with NEI, EPRI, DOE/National Laboratories, NRC licensees, and public stakeholders
- Focus on credible aging mechanisms
- Utilize operating experience and available data to optimize aging management guidance



Summary

- Risk informed approach used in the development of NUREG-2214
- Regulatory Guide 3.78 and ASME Code Case N-860 incorporate operating experience and risk insights to optimize inspection intervals and resource use
- Current staff focus is on developing information to risk inform canister inspection frequencies at non-inland ISFSI sites
- Future work may address fuel performance and AMPs for high burnup fuel

Using Risk to Enable Transportable Microreactors

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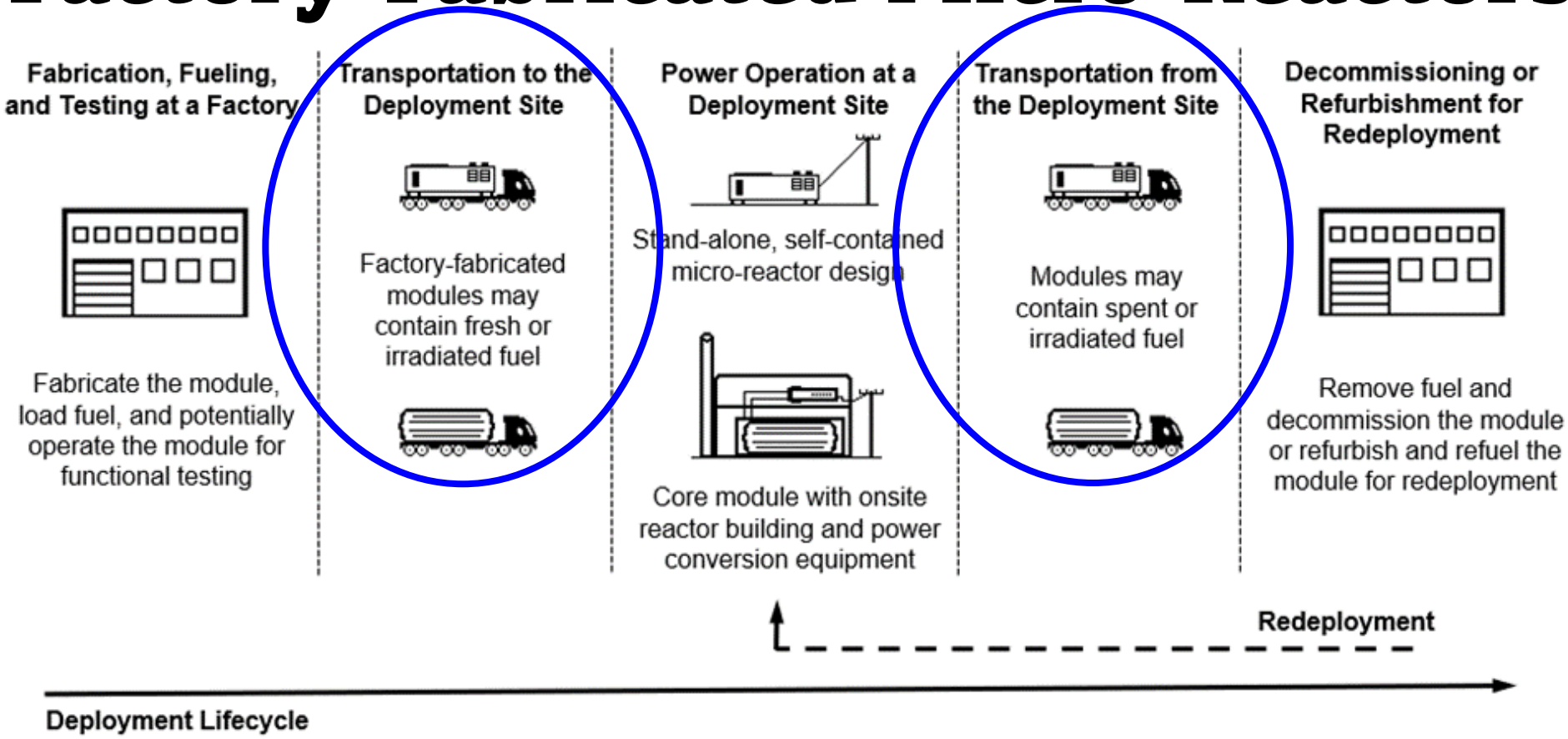
Nuclear Analysis and Risk Assessment Branch
Division of Fuel Management

Key Messages

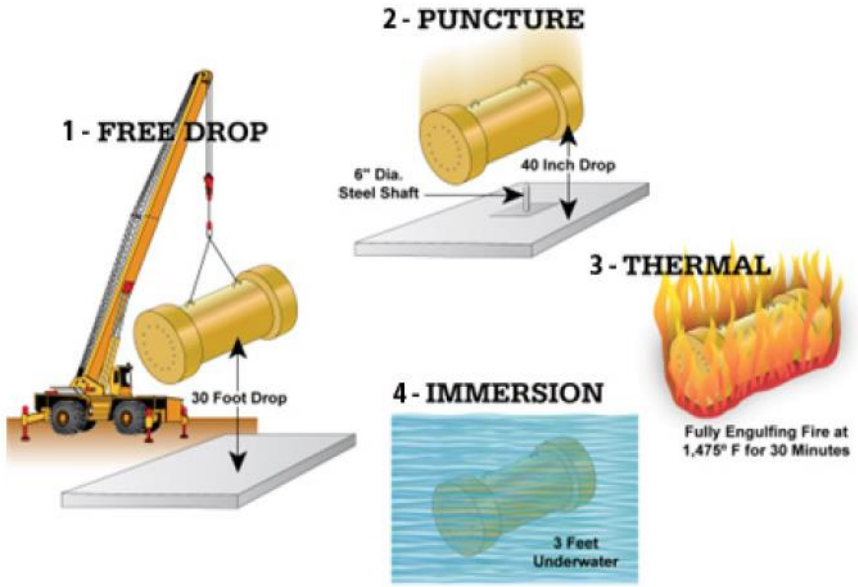
- The NRC endorsed a risk-informed methodology to support transportation of microreactors, enabling a safe and efficient regulatory approval process for innovative designs.
- The methodology enables use of probabilistic risk assessment and risk evaluation guidelines to justify exemptions and inform package design under 10 CFR Part 71.
- Transport regulations in 10 CFR Part 71 offers flexibility to expand the methodology to support additional applications (e.g., fuel types, # of shipments, destinations)

Conceptual Deployment Model for Factory-Fabricated Micro-Reactors



Package Performance Tests and Conditions

- Normal conditions of transport (10 CFR 71.71)
  - Hot and cold temperatures
  - Reduced and increased external pressure
  - Vibration
  - Water spray
  - Free drop (1 to 4 feet)
  - Corner drop
  - Compression test
  - Penetration test



- Hypothetical accident conditions (10 CFR 71.73)
  - 30-foot drop test
  - 40-inch puncture test
  - 30-minute fire at 1,475 degrees Fahrenheit
  - Water immersion test (fissile/nonfissile)

Why a Risk Methodology?

- Hypothetical accident conditions (10 CFR 71.73)
- Additional requirements for Type B packages
  - Containment criteria for normal form material (10 CFR 71.51(a)(1) and (2))
  - Dose rates after hypothetical accident conditions (10 CFR 71.51(a)(2))
- Regulatory approval pathways
  - Alternative test criteria in 10 CFR 71.41(c)
  - Exemptions (10 CFR 71.12) from specific requirements using a risk-informed approach
- Endorsed a risk methodology to support exemptions for Project Pele, discussed in SECY-24-0062

A Risk-Informed Methodology

- The risk-informed methodology consists of (1) risk evaluation guidelines and
  (2) a systematic process to develop a probabilistic risk assessment.
- Risk evaluation guidelines:
  - Frequency-consequence (F-C) plots used as surrogate guidelines for acceptable levels of risk of bounding representative accidents
  - Informed by existing NRC performance criteria for nuclear fuel facilities, U.S. Department of Energy nuclear facilities, and International Atomic Energy Agency risk evaluation guidelines
  - Consistent with similar risk-informed, performance-based approaches endorsed by the NRC, such as described in Regulatory Guide 1.233

Proposed Risk Evaluation Guidelines for the Public

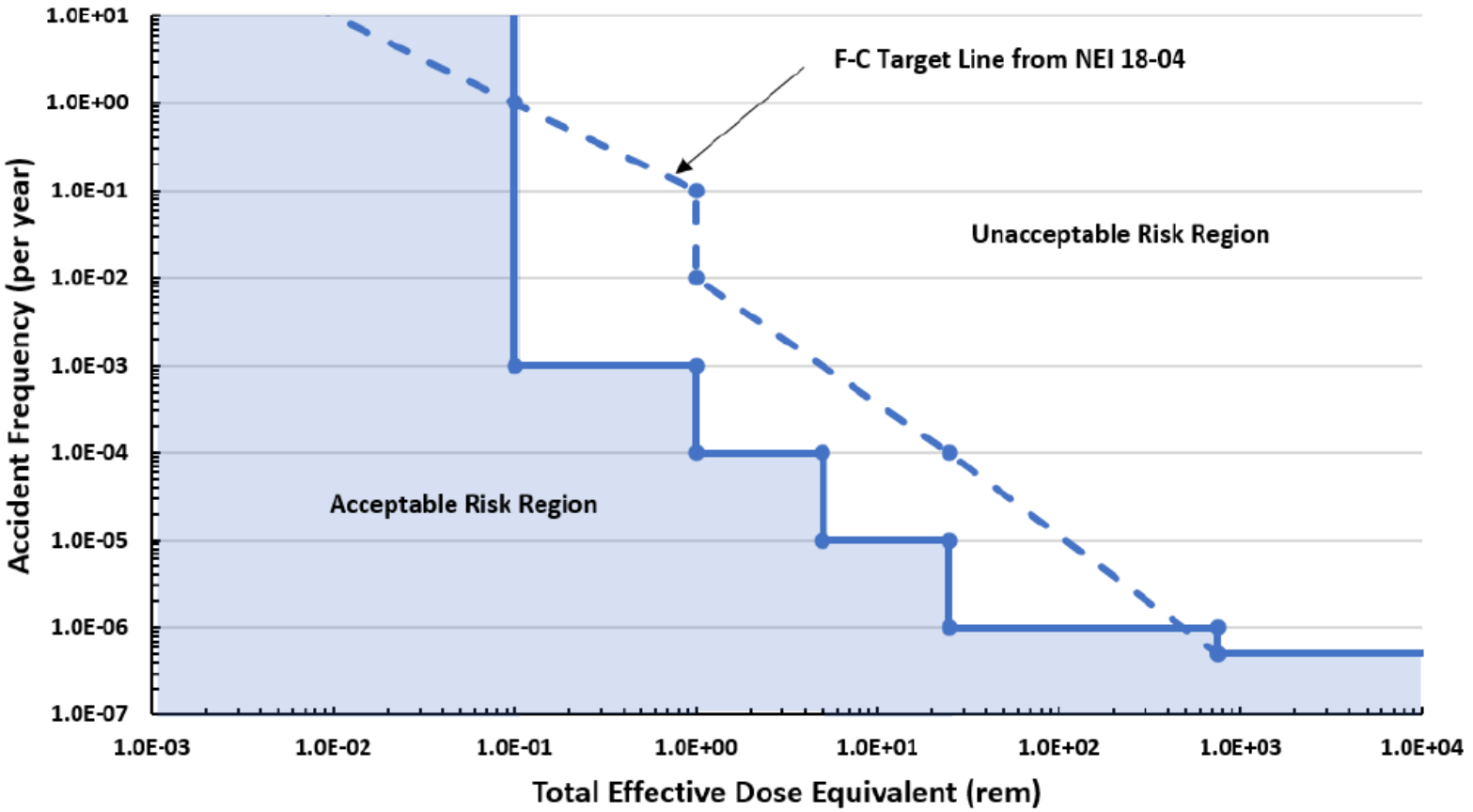


Figure 4.7. Proposed Offsite Public Risk Evaluation Guidelines Chart for Transport of a TNPP Package

Proposed Risk Evaluation Guidelines for Workers

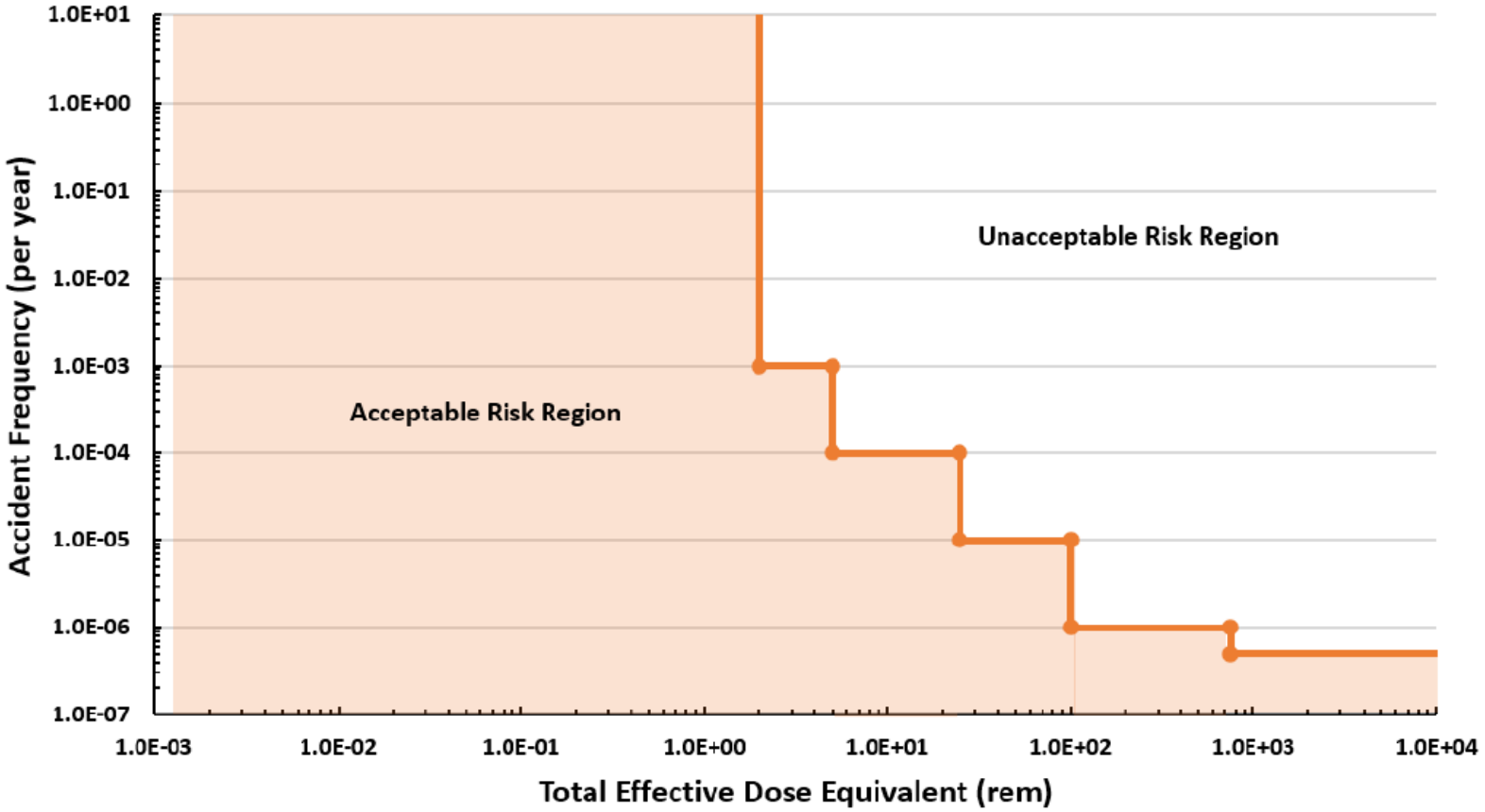


Figure 4.8. Proposed Worker Risk Evaluation Guidelines Chart for Transport of a TNPP Package

A Risk-Informed Methodology

- Probabilistic risk assessment to identify and evaluate bounding representative accidents
- Goals to (1) “inform” the package design regarding the risk significance of containment and shielding features and (2) identify the need for compensatory measures during transportation
- Elements of the probabilistic risk assessment
  - Identification of safety functions
  - Characterization of hazardous conditions to identify accidents
  - Determination of accident likelihoods
  - Consequence analysis
  - Evaluation of probabilistic risk assessment results against risk evaluation guidelines
  - Sensitivity studies
  - Uncertainty analysis
  - Defense in depth

References

- SECY-24-0062: https://www.nrc.gov/docs/ML2332/ML23320A124.html
- Letter of Approval: https://www.nrc.gov/docs/ML2332/ML23321A131.html
- Final Endorsement Letter: https://www.nrc.gov/docs/ML2427/ML24271A054.pdf
- Final PNNL Report: https://www.nrc.gov/docs/ML2426/ML24268A100.html
- NEI 18-04: https://www.nrc.gov/docs/ML1924/ML19241A472.pdf
- Regulatory Guide 1.233: https://www.nrc.gov/docs/ml2009/ml20091l698.pdf

High Burnup Research Cask Data Collection

Steve Vitto
Program Manager
Office of Storage and Transportation
Department of Energy

PRESENTATION TBD

Nuclear Energy Institute

Phenomena Identification and Ranking Table (PIRTs) Update

Electric Power Research Institute (EPRI)

CLOSING REMARKS