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

Advanced Reactor Stakeholder Public Meeting

May 11, 2022

Microsoft Teams Meeting
Bridgeline: 301-576-2978
Conference ID: 556 455 490#

Time	Agenda	Speaker
10:00 – 10:15 am	Opening Remarks/ Adv. Rx Integrated Schedule (Shelley Pitter - Logistics, Steve Lynch)	NRC
10:15 – 10:45 am	Part 53 Rulemaking Process (Steve Lynch)	NRC
10:45 – 11:15 am	Part 53 Framework B Development and Integration Update (William Jessup/Candace de Messieres)	NRC
11:15 am – 12:00 pm	Development of ISG for Assessment of Non-LWR PRA Standard (Trial RG 1.247) Applicability (Hanh Phan)	NRC
12:00 – 1:00 pm	Lunch Break	All
1:00 – 1:30 pm	Overview of Guidance Supporting Part 53 – Discuss Timing of Guidance Release (Jordan Hoellman)	NRC
1:30 – 2:30 pm	Results of Nuclear Energy Institute and U.S. Nuclear Industry Council 2022 Part 53 Industry Survey (Marc Nichol, NEI / Cyril Draffin, USNIC)	NEI/USNIC
2:30 – 2:40 pm	Break	All
2:40 – 3:00 pm	NuScale Lessons Learned (Omid Tabatabai-Yazdi)	NRC
3:00 – 4:35 pm	Development of 50.59 guidance (Michael Tschiltz)	Southern Company
4:35 – 4:55 pm	Update on Pre-Application Engagement on Advanced Reactor Licensing (Courtney Banks, Adrian Muniz, Mallecia Sutton)	NRC
4:55 – 5:00 pm	Future Meeting Planning and Concluding Remarks	NRC

Advanced Reactor Program - Summary of Integrated Schedule and Regulatory Activities*

Strategy 1	Knowledge, Skills, and Capability
Strategy 2	Computer Codes and Review Tools
Strategy 3	Guidance
Strategy 4	Consensus Codes and Standards
Strategy 5	Policy and Key Technical Issues
Strategy 6	Communication

Legend

- Concurrence (Division/Interoffice)
- Federal Register Publication
- Public Comment Period
- Draft Issuance of Deliverable
- Final Issuance of Deliverable
- EDO Concurrence Period
- Commission Review Period**
- ACRS SC/FC (Scheduled or Planned)
- External Stakeholder Interactions
- Public Meeting (Scheduled or Planned)

Present Day

Version 5/6/22

Strategy	Regulatory Activity	Commission Papers	Guidance	Rulemaking	NEIMA	Complete	2021 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2022 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Development of non-Light Water Reactor (LWR) Training for Advanced Reactors (Adv. Rxs) (NEIMA Section 103(a)(5))					X																								
	FAST Reactor Technology				X	X																								
	High Temperature Gas-cooled Reactor (HTGR) Technology				X	X																								
	Molten Salt Reactor (MSR) Technology				X	X																								
	Competency Modeling to ensure adequate workforce skillset					X																								
2	Identification and Assessment of Available Codes					X																								
	Development of Non-LWR Computer Models and Analytical Tools																													
	Code Assessment Reports Volume 1 (Systems Analysis)					X																								
	Reference plant model for Heat Pipe-Cooled Micro Reactor					X																								
	Reference plant model for Sodium-Cooled Fast Reactor (update from version 1 to 2)					X1																								
	Reference plant model for Molten-Salt-Cooled Pebble Bed Reactor (update from version 1 to 2)					X1																								
	Reference plant model for Monolith-type Micro-Reactor																													
	Reference plant model for Gas-Cooled Pebble Bed Reactor																													
	Code Assessment Reports Volume 2 (Fuel Perf. Anayisis)					X																								
	FAST code assessment for metallic fuel					X																								
	FAST code assessment for TRISO fuel					X																								
	Code Assessment Reports Volume 3 (Source Term Analysis)					X																								
	Non-LWR MELCOR (Source Term) Demonstration Project					X																								
	Reference SCALE/MELCOR plant model for Heat Pipe-Cooled Micro Reactor					X																								
	Reference SCALE/MELCOR plant model for High-Temperature Gas-Cooled Reactor					X																								
	Reference SCALE/MELCOR plant model for Molten Salt Cooled Pebble Bed Reactor					X																								

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

Part 53 Rulemaking Process (Steve Lynch)

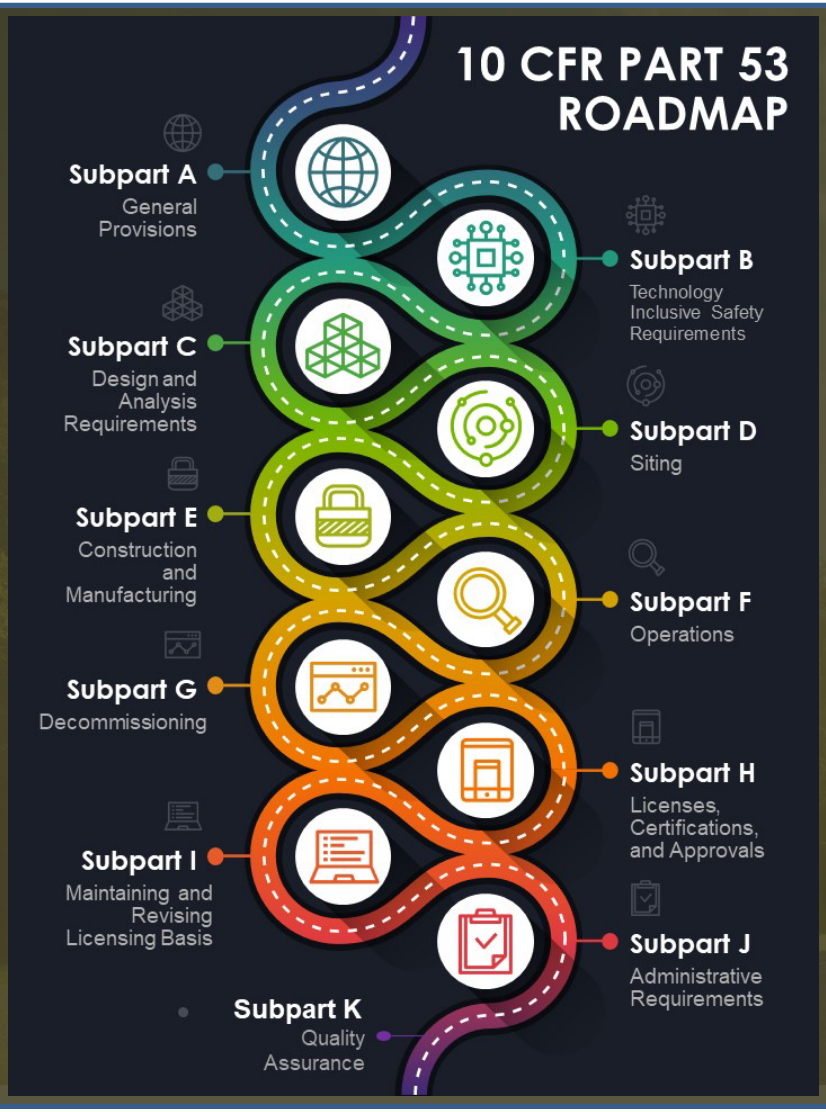
Part 53 Rulemaking Vision, Process, and Status

Steven Lynch, Acting Chief
Advanced Reactor Policy Branch

Pathway to New Regulatory Framework

"Part 53" Rulemaking by July 2025

- Nuclear Energy Innovation and Modernization Act (NEIMA) requirement
- Technology-inclusive, risk-informed and performance based regulatory framework
- Commission direction SRM-SECY-20-0032
- Builds on current activities, including the Licensing Modernization Project
- Significant stakeholder engagement



Part 53 rulemaking addresses plant lifecycle with appropriate flexibilities and safety focus

PART 53 | TRANSFORMATIVE

Establishes a Transformative Regulatory Framework

Part 53 builds on a **strong foundation** of Commission policies and decisions

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FEATURES

- Evolves use of **risk**
- Leverages **performance-based** requirements
- **Modern**izes licensing basis **change process**
- Includes **consequence-oriented** scalable requirements
- Enables operational **flexibility**
- Optimizes balance between flexibility and **predictability**

Pre-Rulemaking

Project Initiation: Rulemaking Plan*

- Required for most new rulemakings
- Defines scope, approach, resource needs
- Ensures early Commission engagement before significant resource expenditures
- Delegated signature authority*

*Requires Commission Approval

Rulemaking Approach

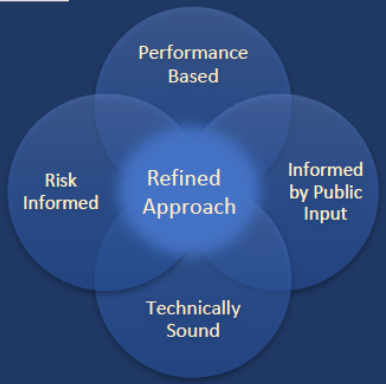
Notice and Comment Rulemaking

Informing the Rulemaking

Public Involvement

- Preliminary Rule Text*
- Advanced Notice of Proposed Rulemaking*
- Public Meeting(s)
- Regulatory Basis*

Note: Tools may be selected depending on issue complexity



- Changes are non-controversial
- Significant Adverse Comments Are Not Anticipated

Consider

Proposed Rule*

- Published for public comment
- Presents basis for proposal and explains how/why it resolves the identified need
- Includes a Regulatory Analysis

Public Input Considered

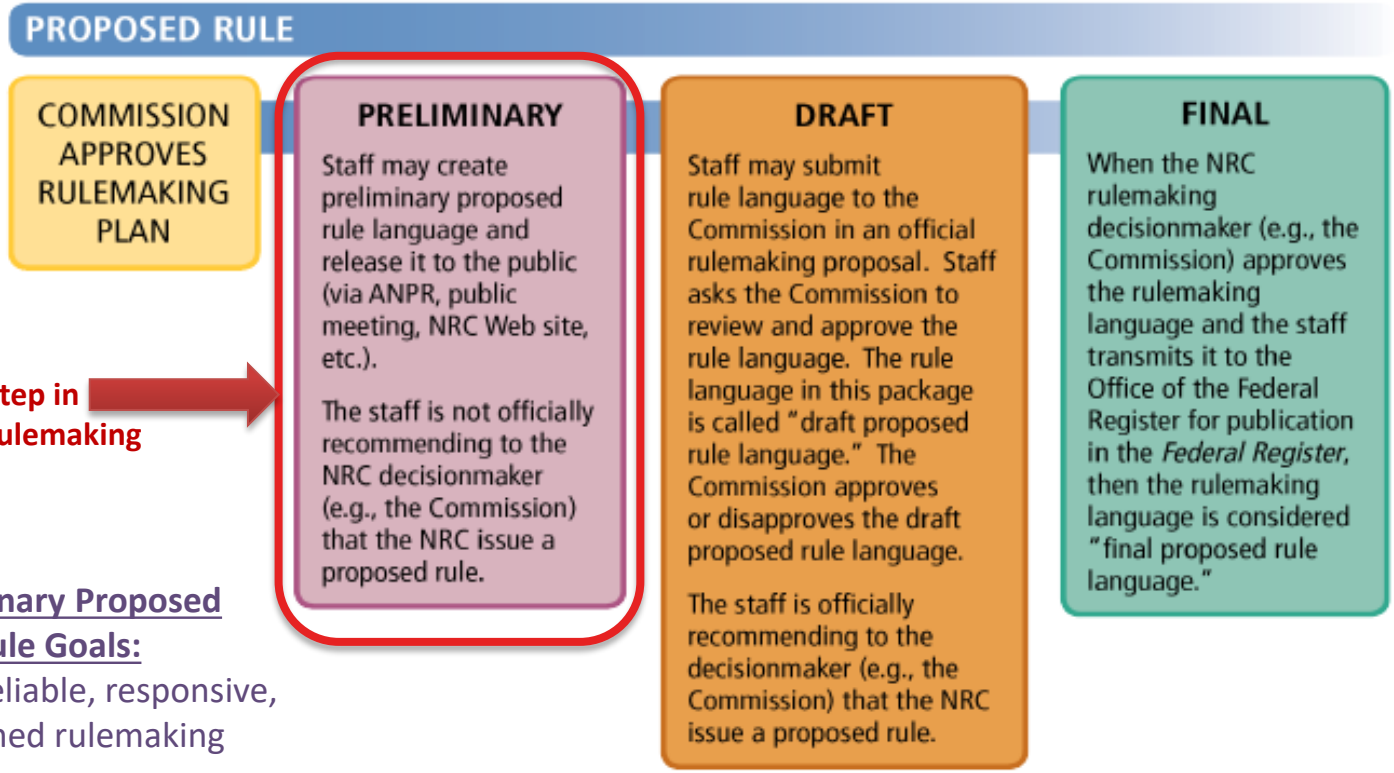
Direct Final Rule*

Final Rule*

- Amends the Code of Federal Regulations and establishes the implementation date
- Responds to all in-scope public comments
- Explains any changes in the final rule from the proposed rule and why those changes were made.

Apply Principles of Good Regulation

PROPOSED RULEMAKING TERMS



Current Step in Part 53 Rulemaking

Preliminary Proposed Rule Goals:

- Develop reliable, responsive, and informed rulemaking
- Increase transparency
- Promote engagement
- Improve clarity

RULEMAKING STATUS

Rule Language

- 2021: definitions (A), safety criteria (B), design and analyses (C), siting (D), construction/manufacturing (E), operations and programs (F), decommissioning (G), licensing processes (H), maintenance of the licensing basis (I), reporting (J), security, access authorization, FFD, traditional alternatives.
- 2022: consolidated rule package (Feb.), 2nd iteration Framework A (May), & 1st iteration Framework B (June)

Industry Input

- Over 1500 public comments received

Stakeholder Engagement

- 16 public meetings and 15 ACRS meetings
- Recent: 3/29 public meeting on key issues, 5/11 stakeholder meeting on Framework B and guidance prioritization
- Planned: 5/19 ACRS meeting on Framework A, 5/25 public meeting on Framework A, early-June public meeting on Framework B
- Future: 6/23-24 ACRS SC meeting on Framework B, 7/6-9 ACRS FC meeting, 7/21 Commission meeting,

Focus Areas

- Continue stakeholder engagement
- Finalize rule language
- Develop rule package (SOCs, regulatory analysis, etc.)
- Developing guidance

CURRENT PART 53 TIMELINE

Oct 2020-Aug 2022
Public Outreach, ACRS Interactions and Generation of Proposed Rule Package

Feb 2023
Draft Proposed Rule to Commission

Jun 2023
Publish Proposed Rule and Draft Key Guidance

Oct 2023
Public Comment Period – 60 days

Nov 2023-Nov 2024
Public Outreach and Generation of Final Rule Package

Dec 2024
Draft Final Rule to Commission

Apr 2025-Jun 2025
Office of Management and Budget and Office of the Federal Register Processing

Jul 2025
Publish Final Rule and Key Guidance

Part 53 Framework B Development and Integration Update (William Jessup/Candace de Messieres)

Part 53 Framework B Development and Integration Update

Outline

- Part 53 Licensing Framework Overview
- Systematic Development Process for Part 53 Framework B
- Part 53 Framework B Integration
- Part 53 Framework B Technical Requirements
- Use of Risk Information in Part 53
- Part 53 Framework B: Alternate Evaluation for Risk Insights (AERI)
- Next Steps and Additional Information

Part 53 Licensing Frameworks

Subpart A - General Provisions

Subpart B - Safety Requirements
Subpart C - Design Requirements
Subpart D - Siting
Subpart E – Construction/Manuf.
Subpart F - Operations
Subpart G - Decommissioning
Subpart H - Licensing Processes
Subpart I - License Maintenance
Subpart J - Reporting
Subpart K - Quality Assurance

Framework A

- Probabilistic Risk Assessment (PRA)-led approach for developing the licensing basis and safety case
- Functional Design Criteria

Subpart N - Purpose/Definitions
Subpart O – Construction/Manuf.
Subpart P - Operations
Subpart Q - Decommissioning
Subpart R – Licensing Process
Subpart S – License Maintenance
Subpart T – Reporting
Subpart U – Quality Assurance

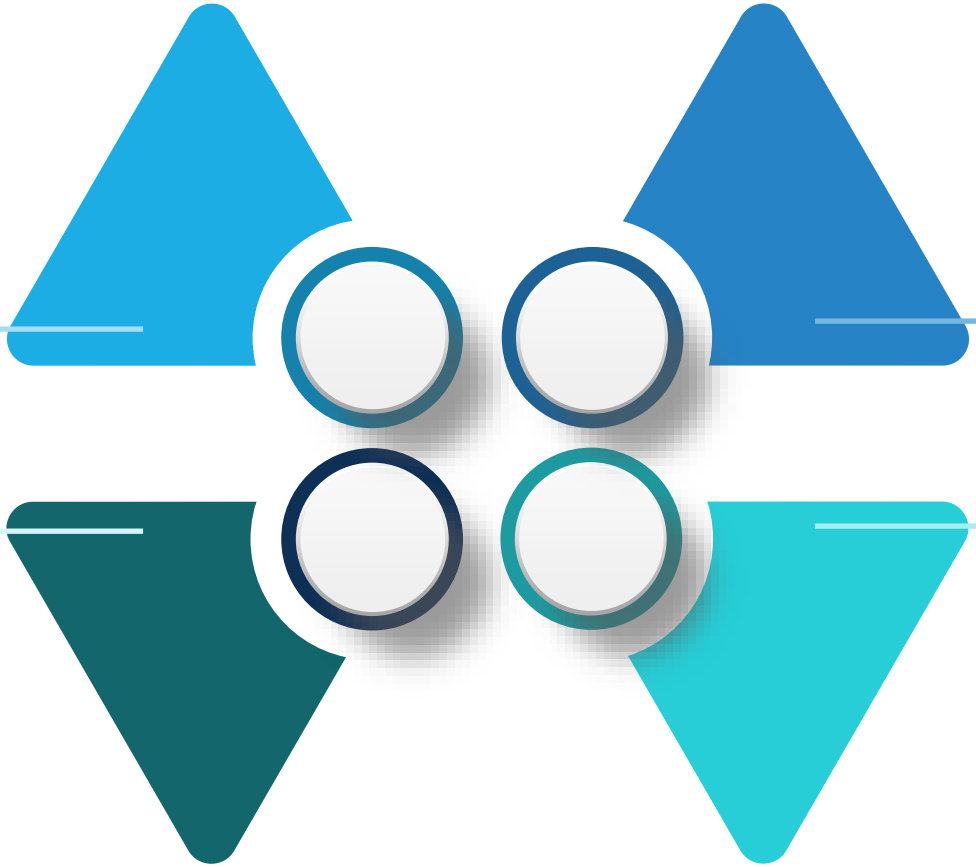
Framework B

- Traditional use of risk insights
- Includes an Alternative Evaluation for Risk Insights (AERI) approach
- Principal Design Criteria

Systematic Development Process

Incorporate Applicable Existing Part 53 Framework Innovations

Leverage Part 50 and 52 Rule Language

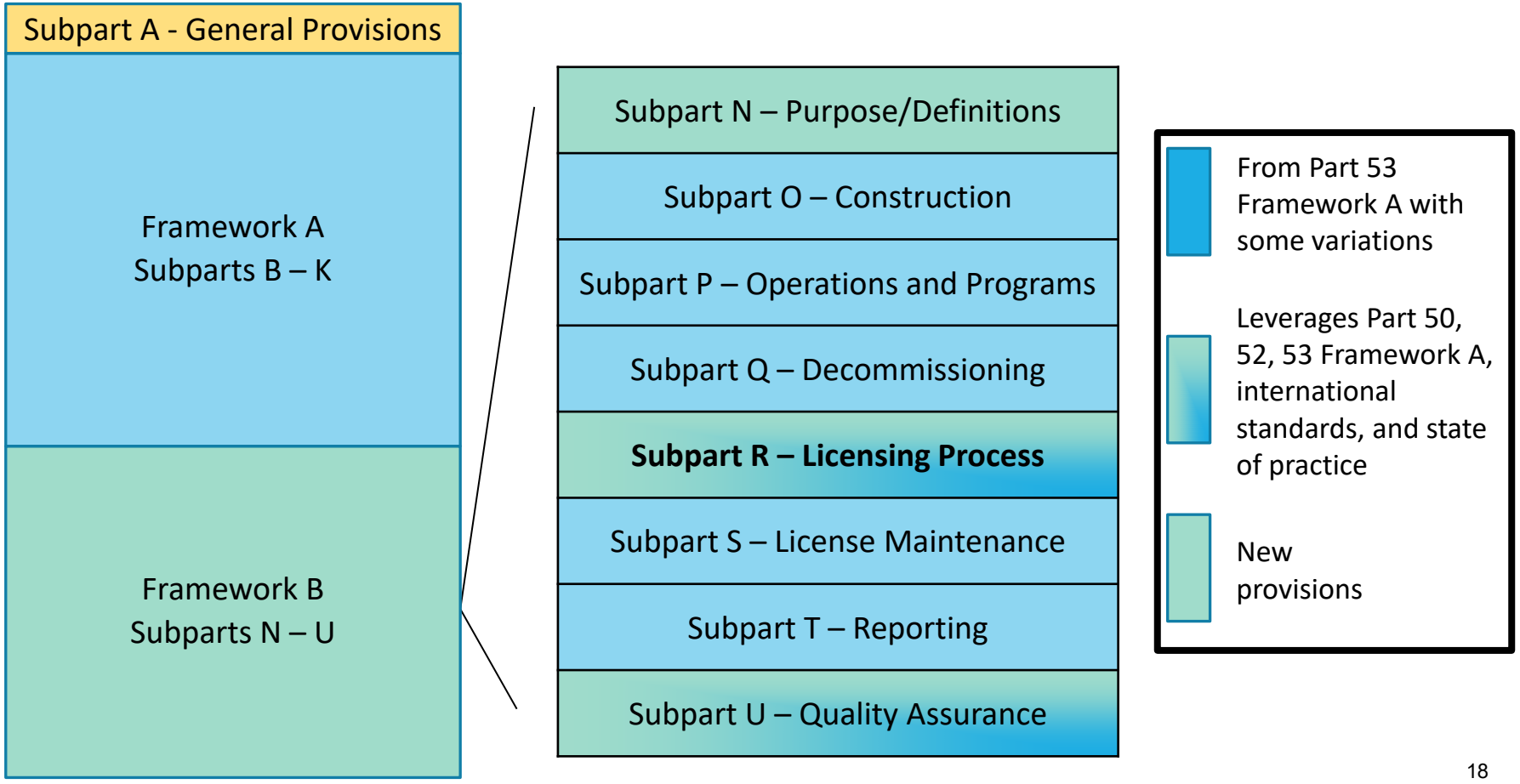


Consider Compatibility with International Standards

Develop Unique Rule Language

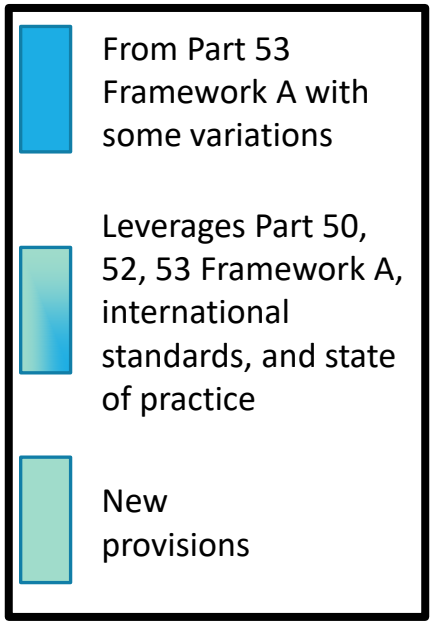
Consider state-of-practice research and experience with other improvements to regulatory structure and licensing processes

Part 53 Framework B



Framework B Subpart R: Licensing Processes

§ 53.4700	General Provisions.
§ 53.4730	**General technical requirements.**
§ 53.4731	Risk-informed classification of structures, systems, and components.
§ 53.4740	Limited work authorizations.
§ 53.4750	Early site permits.
§ 53.4800	Standard design approvals
§ 53.4830	Standard design certifications.
§ 53.4870	Manufacturing licenses.
§ 53.4900	Construction permits.
§ 53.4960	Operating licenses.
§ 53.5010	Combined licenses.

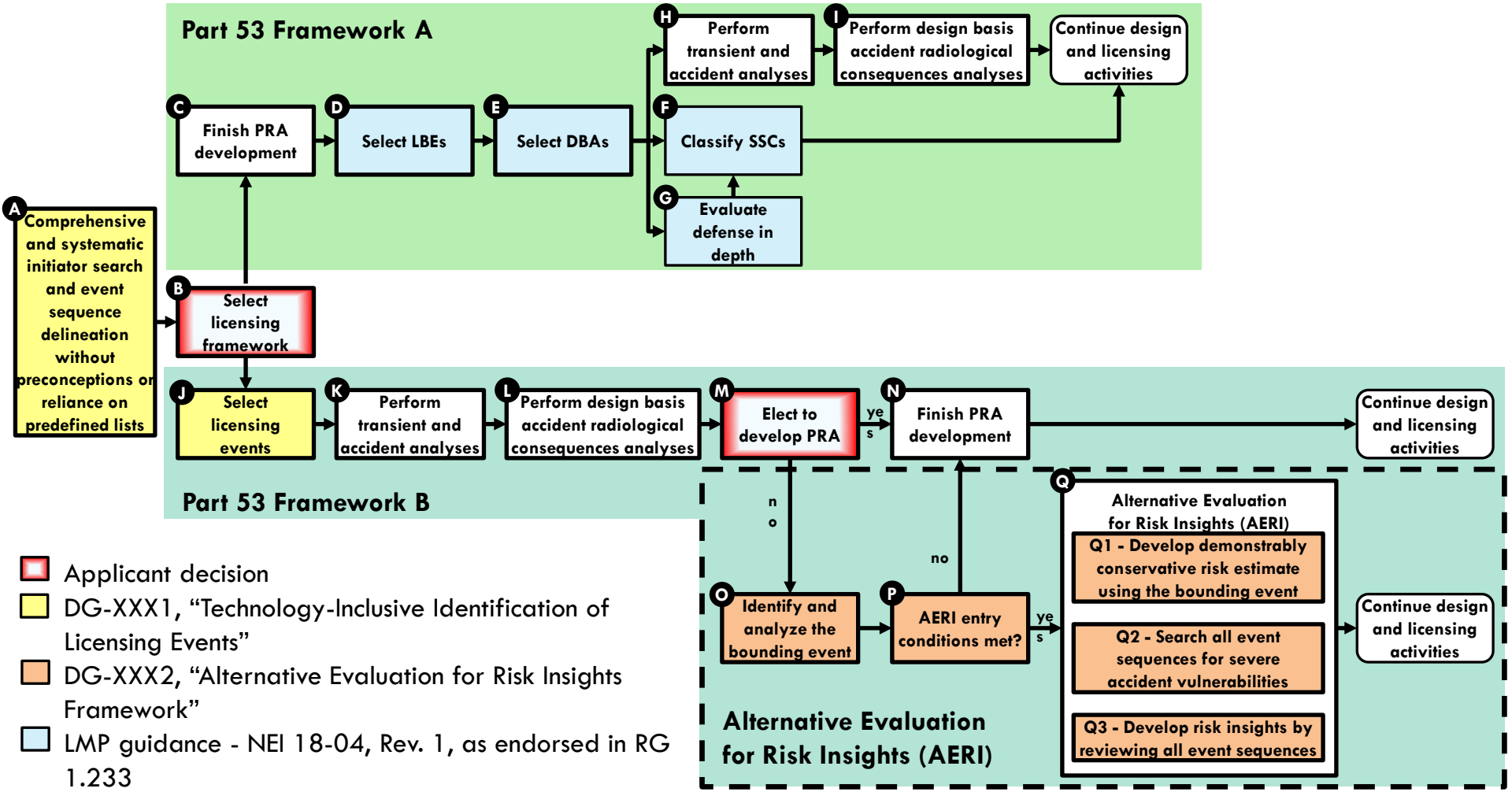


Subpart R:
§ 53.4730 General Technical Requirements

§ 53.4730(a)(1) – (37) provide technical requirements for applications for each licensing process (e.g., construction permit, operating license) as specified

- § 53.4730(a)(1): Site Parameters.
- § 53.4730(a)(2): Facility description.
- § 53.4730(a)(4): Design bases.
- § 53.4730(a)(15): Emergency plans.
- § 53.4730(a)(23): Technical specifications.
- § 53.4730(a)(34): Description of risk evaluation.
- § 53.4730(a)(36): Functional containment.

Part 53 Licensing Frameworks – Risk Evaluation Perspective



- Applicant decision
- DG-XXX1, "Technology-Inclusive Identification of Licensing Events"
- DG-XXX2, "Alternative Evaluation for Risk Insights Framework"
- LMP guidance - NEI 18-04, Rev. 1, as endorsed in RG 1.233

AERI Draft Preliminary Proposed Rule Text

53.4730(a)(34) *Description of risk evaluation*.
A description of the risk evaluation developed for the commercial nuclear plant and its results. The risk evaluation may be based on:

(i) A probabilistic risk assessment (PRA), or *Can always elect to develop a PRA*

(ii) An alternative evaluation for risk insights (AERI), provided that:

(A) The dose resulting from a postulated bounding event to an individual located at any point on the boundary of the exclusion area does not exceed 1 rem TEDE over the first four days following a release, an additional 2 rem TEDE in the first year, and 0.5 rem TEDE per year in the second and subsequent years, and

(B) The distance from each radionuclide source in the commercial nuclear plant to the boundary of the exclusion area is less than 100 meters (328 feet).

EPA Early Phase and Intermediate Phase Protective Action Guidelines

Underlying assumptions for the 100-meter entry condition:

- *Linear no threshold dose-response model*
- *Uniform population density*
- *Power law dose vs. distance model (NUREG-0396)*
- *Exclusion area boundary (EAB) = Emergency Planning Zone (EPZ) boundary*
- *Bounding event does not require evacuation or relocation, if it occurs*

- *If the entry conditions and underlying assumptions are met, then the conditional individual latent cancer fatality risk is approximately 2E-6 per event*
- *If reactor trip frequency is 1/year, then meet the QHO*

AERI Results and Implementation

Results

- Demonstrates that QHOs are met, searches for severe accident vulnerabilities, and provides risk insights without a requirement for a PRA
- Inherently addresses the mitigation of beyond-design basis events requirements when AERI entry conditions are met

Implementation

- Must be maintained (AERI is not a one-and-done approach)
- Voluntary risk-informed applications (e.g., SSC classification, risk-managed technical specifications) require PRA

Next Steps

- Release draft preliminary proposed rule language and hold public meeting to discuss Framework B (tentative June 2022)

- Discuss with Advisory Committee on Reactor Safeguards
  - Subcommittee: June 23 - 24, 2022
  - Full Committee: July 6 - 9, 2022

Additional Information

- Additional information on the 10 CFR Part 53 rulemaking is available at https://www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/part-53.html
- For information on how to submit comments go to https://www.regulations.gov and search for Docket ID NRC-2019-0062
- For further information, contact Robert Beall, Office of Nuclear Material Safety and Safeguards, telephone: 301-415-3874; email: Robert.Beall@nrc.gov

Development of ISG for Assessment of Non-LWR PRA Standard (Trial RG 1.247) Applicability

(Hanh Phan)

U.S.NRC

United States Nuclear Regulatory Commission

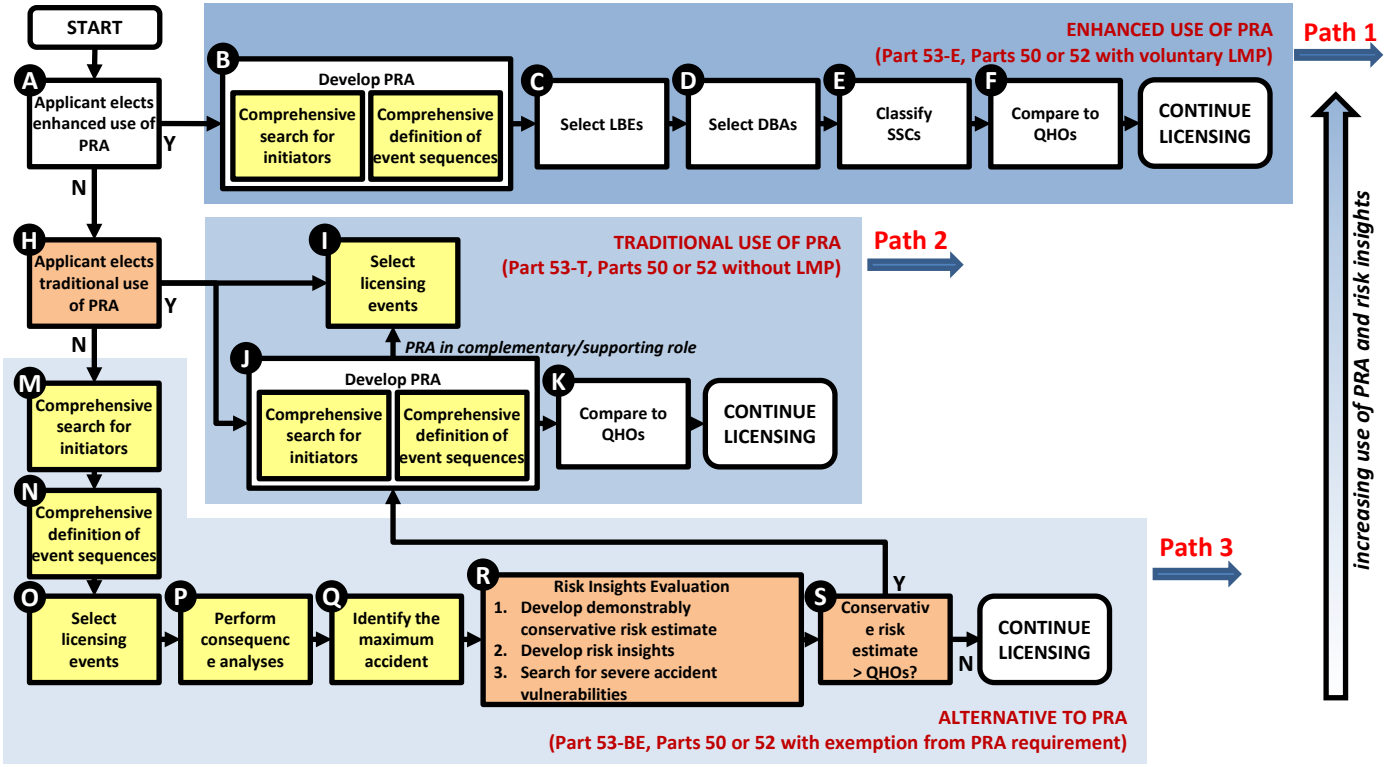
Protecting People and the Environment

Update on the NLWR PRA Standard Applicability and Gap Assessment

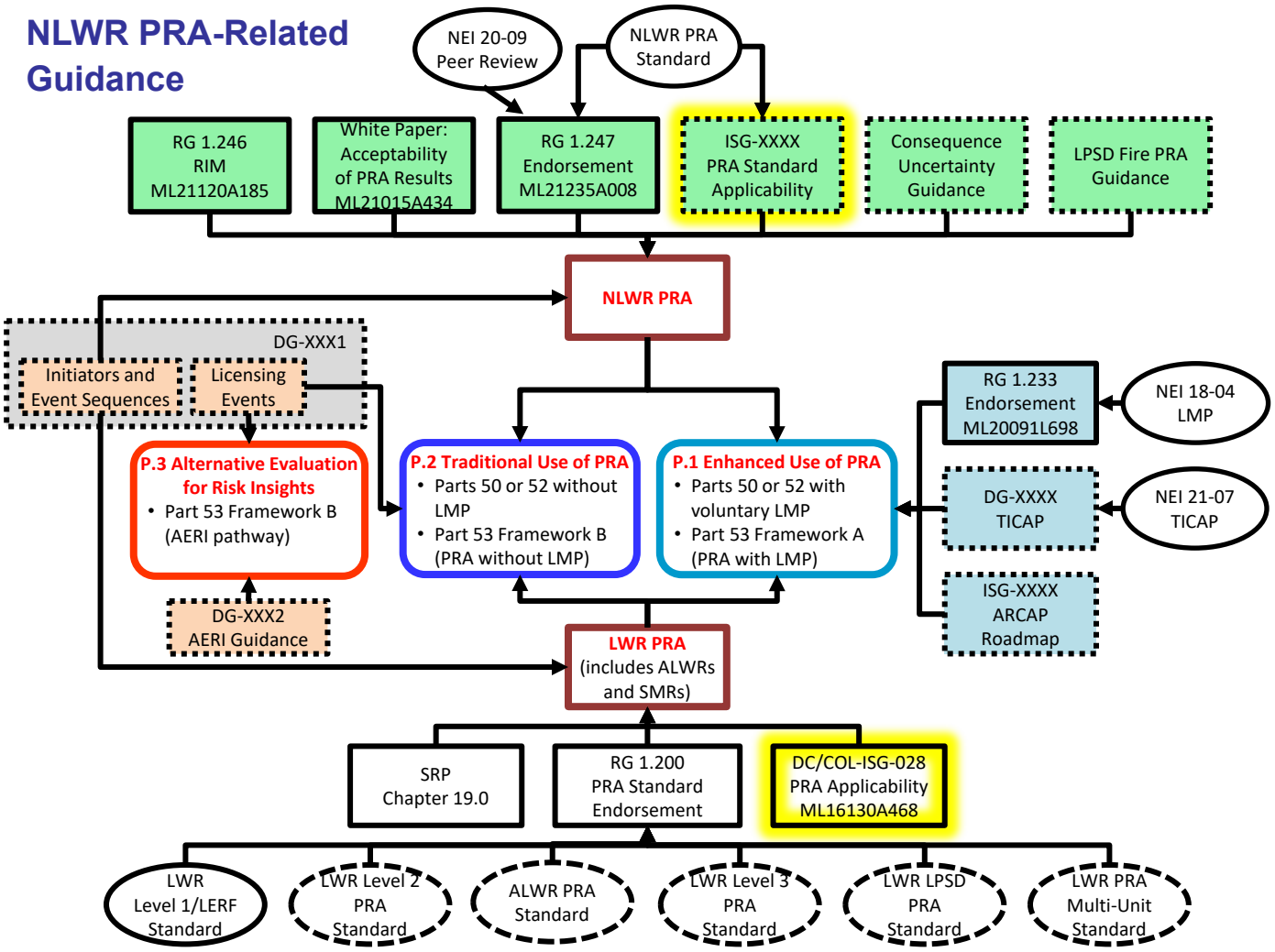
Purpose

- Provide an update on the “NLWR PRA Standard Applicability and Gap Assessment”
- Further engage with stakeholders on NLWR PRA-related guidance development

Licensing Pathways



NLWR PRA-Related Guidance



NLWR PRA Standard Scope

- Addresses all radiological sources at the plant
  - Reactor cores
  - Spent fuel
  - Fuel reprocessing facilities
  - Accident scenarios that lead to a radioactive release from multiple radiological sources
- Addresses all hazards (excludes LPSD Fire)
  - All internal hazards (e.g., internal initiating events, internal floods, internal fires)
  - All external hazards (e.g., seismic events, external floods, high wind events)
- Addresses all plant operating states (e.g., at-power, low-power, shutdown)
- A Level 3 PRA
  - Develop the frequencies of accident scenarios from the occurrence of an initiating event until the release of radioactive materials to the environment
  - Estimate the consequences that result from the release

NLWR PRA Standard
ASME/ANS RA-S-1.4-2021

Includes:

- 18 PRA elements
- 247 high level requirements (HLRs)
- 1,233 supporting requirements (SRs)
- ~ 617 notes in the nonmandatory appendices
- 238 definitions

PRA Elements

Table 1.4-1 PRA Elements and Hazard Groups Addressed in This Standard

PRA Elements	Scope of Hazard Groups		
	Internal Events	Other Internal Hazards	External Hazards
Plant Operating State Analysis (POS)	X	X	X
Initiating Event Analysis (IE)	X	X	X
Event Sequence Analysis (ES)	X	X	X
Success Criteria Development (SC)	X	X	X
Systems Analysis (SY)	X	X	X
Human Reliability Analysis (HR)	X	X	X
Data Analysis (DA)	X	X	X
Internal Flood PRA (FL)		X	
Internal Fire PRA (F)		X	
Seismic PRA (S)			X
Hazards Screening Analysis (HS)			X
High Winds PRA (W)			X
External Flooding PRA (XF)			X
Other Hazards PRA (O)			X
Event Sequence Quantification (ESQ)	X	X	X
Mechanistic Source Term Analysis (MS)	X	X	X
Radiological Consequence Analysis (RC)	X	X	X
Risk Integration (RI)	X	X	X

High Level Requirements

Table 4.3.1.1-1 High Level Requirements for Plant Operating States Analysis (POS)

Designator	Requirement
HLR-POS-A	The Plant Operating State Analysis shall use a structured, systematic process to identify and define POSs to be considered in the PRA …
HLR-POS-B	The Plant Operating State Analysis shall justify all screening and grouping of POSs or plant evolutions to facilitate an efficient estimation of event …
HLR-POS-C	The Plant Operating State Analysis shall determine the POS frequencies and durations along with the representative decay heat levels and …
HLR-POS-D	The documentation of the Plant Operating State Analysis shall provide traceability of the work.

Supporting Requirements

Table 4.3.1.1-2 Supporting Requirements for HLR-POS-A

The Plant Operating State Analysis shall use a structured, systematic process to identify and define POSs to be considered in the PRA, consistent with the specific reactor design and scope of the PRA. (HLR-POS-A)

Index No. POS-A	Capability Category I	Capability Category II
POS-A1	IDENTIFY a representative set of plant evolutions to be analyzed. INCLUDE, at a minimum, plant evolutions from at-power operations.	IDENTIFY a representative set of plant evolutions to be analyzed, including refueling outages, …
POS-A2	For each identified plant evolution, REVIEW available plant- or design-specific documentation and records for the following: (a) operating modes or operational conditions; (b) reactor coolant boundary (RCB) configurations, such as vented or not vented; whether temporary reactor coolant system (RCS) penetrations are installed and their differential pressure capability changes in … (c) range of RCS parameters (e.g., power level or decay heat level, average reactor coolant temperatures, pressures, and coolant inventories, and … (d) … (e) … (f) … (g) … (h) … See Note POS-N-5, POS-N-6, POS-N-7, POS-N-8	

Examples of Supporting Requirements That Only Apply to Certain Plant Licensing Stages

No.	SR	CC-I	CC-II	Remarks
1	POS-A1	IDENTIFY a representative set of plant evolutions to be analyzed…	IDENTIFY a representative set of plant evolutions to be analyzed, …	Applies to all licensing stages
2	POS-A5	**For PRAs performed during the pre-operational stage,** ENSURE the level of detail in delineating the POSs is consistent with the level of detail of the design information available …		Applies during plant design and construction
3	RCAD-A8	**For PRAs performed on a bounding site,** IDENTIFY assumptions made due to the lack of site details that influence the atmospheric transport and dispersion conditions.		Only applies prior to site selection
4	WFR-A3	**For PRAs conducted on a specific site,** ENSURE that the wind fragilities are site-specific.		Applies after site selection
5	SHA-A1	For the seismic hazards analysis, either: **(a)** **IDENTIFY the site** at which the reactor being analyzed is located, or **(b)** **DESCRIBE a bounding site** and JUSTIFY that the bounding site bounds the list of sites in the scope of the PRA.		Part (a) applies after site selection Part (b) applies prior to site selection
6	POS-A4	**For operating plants,** ENSURE the level of detail in the delineation of POSs is consistent with the as-built and as-operated plant sufficient …		Applies after initial fuel load
7	POS-C1	Within the selected plant evolutions, CALCULATE the mean duration and the mean time after shutdown for each POS **based on a review of applicable plant- or design-specific record.**		Applies after operating experience accrues

Slide 33

ISG Objective

Convey the NRC staff position on the use of NLWR PRA standard ASME/ANS RA-S-1.4-2021 for PRAs performed in support of design certification (DC), standard design approval (SDA), manufacturing license (ML), combined license (COL), construction permit (CP), and operating license (OL), at initial fuel loading, and during first update/upgrade, with or without LMP process, specifically:

- The applicability of each high-level requirement (HLR) and supporting requirement (SR) in the PRA standard
- The expected capability category, CC I or CC II
- New SRs necessary for specific conditions of the PRA performed to support LMP application

Applicable Regulations and Applications

- This ISG applies to applications for NLWR licensing under 10 CFR Part 50
  - Current regulations do not require applicants for Part 50 construction permits or operating licenses to provide PRA-related information
  - Rulemaking “Incorporation of Lessons Learned from New Reactor Licensing Process (Parts 50 and 52 Licensing Process Alignment),” Docket NRC-2009-0196, RIN-3150-AI66
- This ISG applies to applications for NLWR licensing under 10 CFR Part 52
  - Subpart B - Standard Design Certification (DC)
  - Subpart C - Combined License (COL)
  - Subpart E - Standard Design Approval (SDA)
  - Subpart F - Manufacturing License (ML)
- This ISG may apply to the proposed 10 CFR Part 53
  - Rulemaking “Risk Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors,” Docket NRC-2019-0062, RIN 3150-AK31
- This ISG applies to the PRAs at initial fuel loading and first update/upgrade

Examples of PRA Standard High-Level Requirements and Supporting Requirements

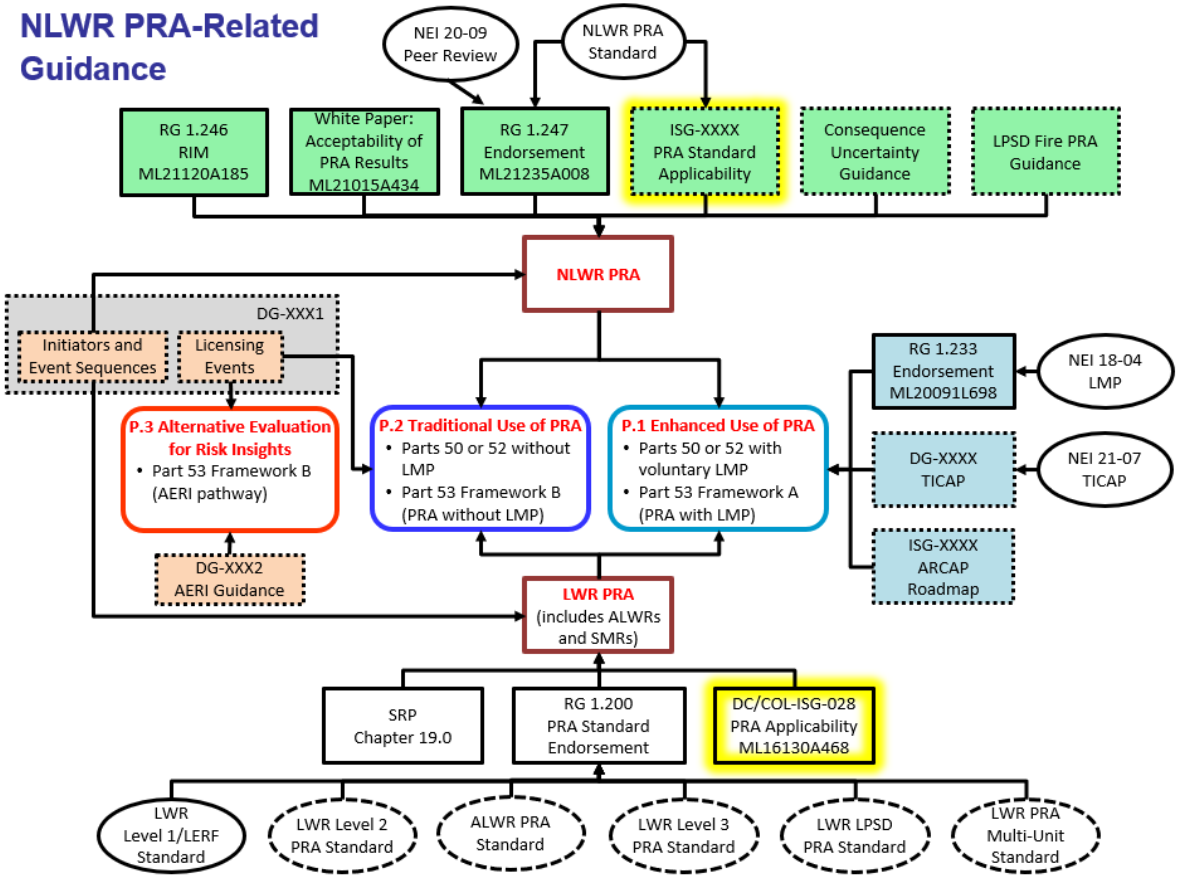
HLR and SR	Position	Discussion	Without LMP and RI Applications					Utilizing LMP Process				
			DC/ SDA/ ML	CP	COL/ OL	Fuel-Load	1st Update/ Upgrade	DC/ SDA/ ML	CP	COL/ OL	Fuel-Load	1st Update/ Upgrade
HLR-HR-D	**No Objection**	**None.**	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
HR-D1	No Objection	None.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
HR-D2	Qualification	CC-II is expected to be met for all LMP applications, consistent with current best practice.	I	I	I	I	I	II	II	II	II	II
HR-D3	No Objection	None.	yes	yes	yes	NA	NA	yes	yes	yes	NA	NA
HR-D4	Qualification	CC-I is expected to be met for DC, SDA, ML, and CP LMP applications because conservative estimates of the pre-initiator HEPs is conservative for LMP applications and CC-II is expected for all other LMP applications consistent with current best practice.	I	I	I	I	I	I	I	II	II	II
HR-D5	No Objection	None.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
HR-D6	No Objection	None.	NA	NA	NA	yes	yes	NA	NA	NA	yes	yes
HR-D6a	Qualification	Because recovery of pre-initiator operator errors is allowable for pre-operational plants by SR HR-D5, this SR is added to provide for the same scope as for operating plants in SR HR-D6.	NA	NA	NA	NA	NA	yes	yes	yes	NA	NA
HR-D7	No Objection	None.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
HR-D8	Qualification	For all LMP application stages, CC-II is expected to be MET because the use of mean estimates of event sequence frequencies and of consequences.	I	I	I	I	I	II	II	II	II	II
HR-D9	No Objection	None.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
HR-D10	Clarification	This SR is applicable for PRA performed during pre-operational stage only.	yes	yes	yes	yes	NA	yes	yes	yes	yes	NA

Demonstrating Acceptability of PRA and Its Results Used in an Application – RG 1.247, Section C.3

For all applications, the PRA-related information provided in the submittal should:

- Describe the PRA's scope, level of detail, and degree of plant representation
- Demonstrate that the PRA has been developed and used in a technically acceptable manner, including the appropriateness of the assumptions and approximations
- Identify the application-specific acceptance criteria and demonstrate that they have been met

What else is missing?



ACRONYMS/ABBREVIATIONS

AERI	alternative evaluation for risk insights
ANS	American Nuclear Society
ASME	American Society of Mechanical Engineers
CC	capability category
COL	combined license (10 CFR Part 52, Subpart C)
CP	construction permit (10 CFR Part 50)
DBA	design-basis accident
DC	design certification (10 CFR Part 52, Subpart B)
DG	draft regulatory guide
HLR	high-level requirement
HR	human reliability
ISG	interim staff guidance
LBE	licensing-basis event
LMP	licensing modernization project
LPSD	low-power and shutdown
ML	manufacturing license (10 CFR Part 52, Subpart F)
NLWR	non-light water reactor
OL	operating license (10 CFR Part 50)
POS	plant operating state
PRA	probabilistic risk assessment
QHOs	quantitative health objectives
RI	risk-informed
RIM	reliability and integrity management
SDA	standard design approval (10 CFR Part 52, Subpart E)
SR	supporting requirement
SSC	system, structure, and component

Overview of Guidance Supporting Part 53 – Discuss Timing of Guidance Release
(Jordan Hoellman)

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

Overview of Guidance Supporting 10 CFR Part 53

May 11, 2022

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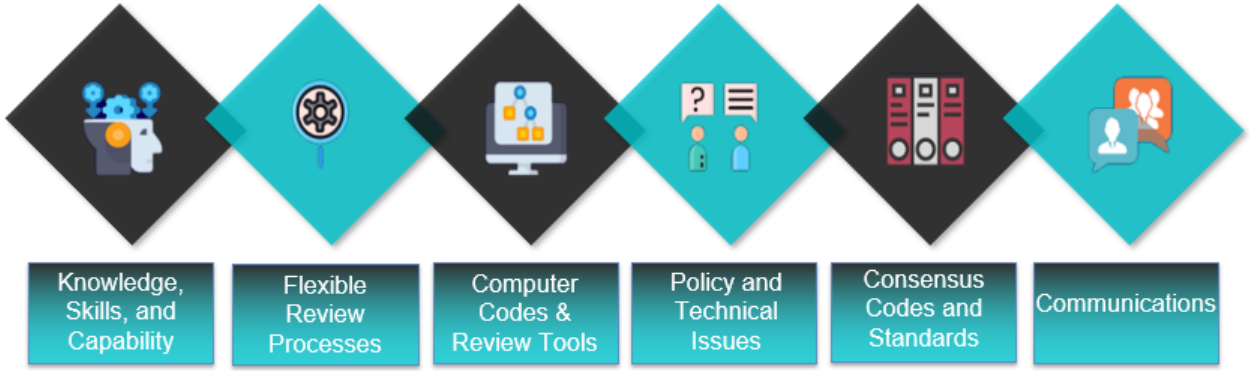
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC's Vision & Strategy (2016)

Executing the Vision: Implementation Action Plans (2017)



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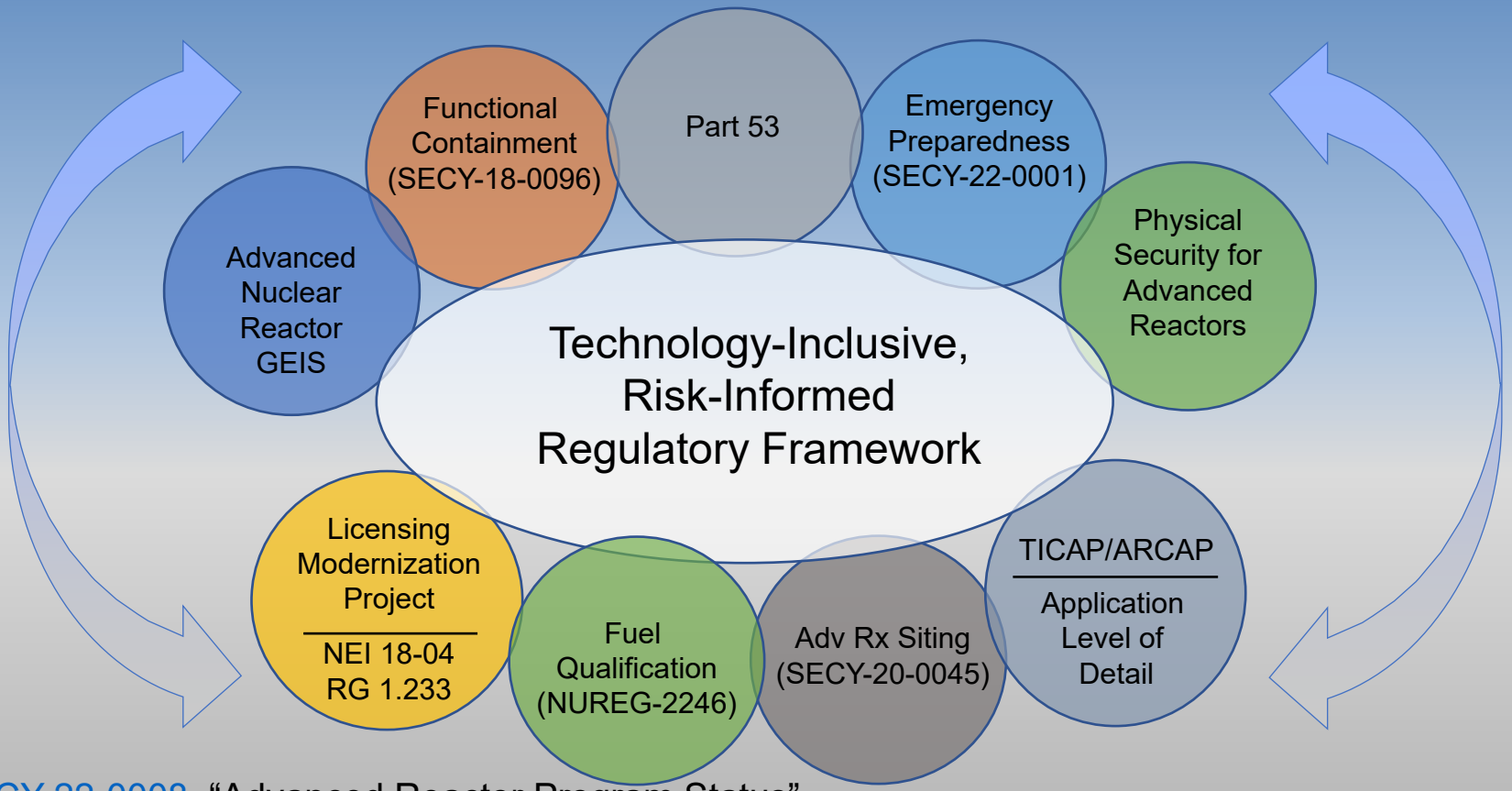
Modernizing the Regulatory Framework

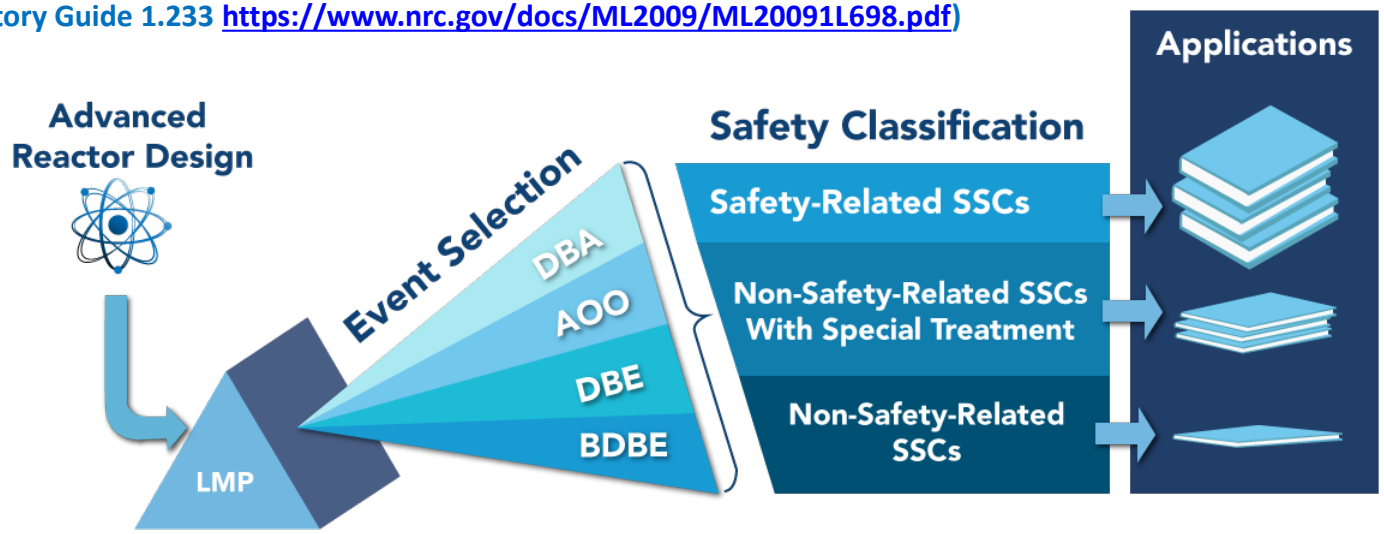


See SECY-22-0008, "Advanced Reactor Program Status"

Licensing Modernization Project

A risk-informed, consequence-oriented approach to establish licensing basis and content of applications

(see Regulatory Guide 1.233 https://www.nrc.gov/docs/ML2009/ML20091L698.pdf)



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SECY-20-0032 and SRM, Rulemaking Plan

"The staff should accelerate its timeline while balancing the need to produce a high-quality, thoroughly vetted regulation … to achieve publication of the final rule by October 2024."

- Staff's response to SRM identified timing of guidance document development to support the Part 53 rulemaking as an uncertainty in meeting the accelerated schedule
  - Focus resources on developing the proposed rule language
  - Possible need to publish proposed rule before completing draft supporting guidance
  - Continue engaging external stakeholders to ensure common prioritization of guidance documents
  - Support early applications under Parts 50/52 (e.g., DOE's Advanced Reactor Demonstration Program)

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Key Guidance Overview

Existing

- Licensing Modernization Project (NEI 18-04 & RG. 1.233)
- Siting Criteria (RG 4.7)
- Fuel Qualification Framework (NUREG-2246)

Under Development

Near-Term

- Non-LWR PRA Standard
- TICAP/ARCAP (NEI 21-07)
- High Temp Materials (ASME III-5)
- Reliability & Integrity Mgt (ASME XI-2)
- Fuel Qualification (technology-specific)
- PRA Level of Detail (NEI-led)
- Seismic Design/Isolators
- Emergency Planning
- Change Process (SNC-led)
- QA Alternatives (NEI-led)
- Operator Training Program

Part 53

- Initiating Events
- Qualitative Risk Estimate/Insights (AERI)
- Operator licensing Exam
- Human Factors Engineering
- Concept of Operations/ Staffing
- Fitness for Duty
- Access Authorization
- Cyber Security
- Physical Security
- Materials Compatibility ISG

Future

- Analytical Margin
- Chemical Hazards
- Manufacturing
- Technical Specifications
- Facility Safety Program
- Contents of Applications for Framework B

Existing Guidance

Existing

- Licensing Modernization Project (NEI 18-04 & RG. 1.233)
- Siting Criteria (RG 4.7)
- Fuel Qualification Framework (NUREG-2246)

- Existing guidance documents currently exist and will be referenced in the Part 53 rulemaking package as key guidance.
- Conforming changes will be needed to ensure they are applicable to Part 53.
- Revision will occur between proposed rule and final rule stages.

Guidance Under Development

Under Development

Near-Term

- Non-LWR PRA Standard
- TICAP/ARCAP (NEI 21-07)
- High Temp Materials (ASME III-5)
- Reliability & Integrity Mgt (ASME XI-2)
- Fuel Qualification (technology-specific)
- PRA Level of Detail (NEI-led)
- Seismic Design/Isolators
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- QA Alternatives (NEI-led)
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Part 53

- Initiating Events
- Qualitative Risk Estimate/Insights (AERI)
- Operator licensing Exam
- Human Factors Engineering
- Concept of Operations/ Staffing
- Fitness for Duty
- Access Authorization
- Cyber Security
- Physical Security
- Materials Compatibility

- Near-term guidance documents are currently under development and will be referenced as key guidance.
- These will be issued prior to the finalization of Part 53 to support near-term applicants and will need conforming changes to ensure they are applicable to Part 53.
- Revision will occur between proposed rule and final rule stages.

- Part 53-specific guidance documents are currently under development and are expected to be included with the Part 53 rulemaking package as key guidance.

Future Guidance

- Future guidance documents are identified as future guidance that may need to be developed to support Part 53.
- These guidance documents may be referenced in the Part 53 rulemaking document as under development and are expected to be completed to support the final rule.
- Additional operational program guidance and reporting requirements guidance may be provided with the final rule.

Future

- Analytical Margin
- Chemical Hazards
- Manufacturing
- Technical Specifications
- Facility Safety Program
- Contents of Applications for Framework B

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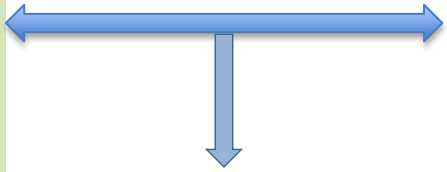
ARCAP and TICAP - Nexus

Outline Safety Analysis Report (SAR) – Based on TICAP Guidance

1. General Plant Information, Site Description, and Overview of the Safety Case
2. Methodologies and Analyses
3. Licensing Basis Event (LBE) Analysis
4. Integrated Evaluations
5. Safety Functions, Design Criteria, and SSC Safety Classification
6. Safety Related SSC Criteria and Capabilities
7. Non-safety related with special treatment SSC Criteria and Capabilities
8. Plant Programs

Additional SAR Content –Outside the Scope of TICAP

9. Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste
10. Control of Occupational Doses
11. Organization and Human-System Considerations
12. Post-construction Inspection, Testing and Analysis Programs



Audit/inspection of Applicant Records

- Calculations
- Analyses
- P&IDs
- System Descriptions
- Design Drawings
- Design Specs
- Procurement Specs
- Probabilistic Risk Assessment

Additional Portions of Application

- Technical Specifications
- Technical Requirements Manual
- Quality Assurance Plan (design)
- Fire Protection Program (design)
- Quality Assurance Plan (construction and operations)
- Emergency Plan
- Physical Security Plan
- SNM physical protection program
- SNM material control and accounting plan
- Cyber Security Plan
- Fire Protection Program (operational)
- Radiation Protection Program
- Offsite Dose Calculation Manual
- Inservice inspection/Inservice testing (ISI/IST) Program
- Environmental Report
- Site Redress Plan
- Exemptions, Departures, and Variances
- Facility Safety Program (under consideration for Part 53 applications)

- Safety Analysis Report (SAR) structure based on clean sheet approach

*Additional contents of application outside of SAR are still under discussion. The above list is draft and for illustration purposes only.


THANK YOU
Questions?
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Results of Nuclear Energy Institute and U.S. Nuclear Industry Council 2022 Part 53 Industry Survey (Marc Nichol, NEI / Cyril Draffin, USNIC)

Results of Nuclear Energy Institute and U.S. Nuclear Industry Council 2022 Part 53 Industry Survey

For Public Release at
U.S. Nuclear Regulatory Commission (NRC)
Advanced Reactor Stakeholder Meeting
11 May 2022

Cyril W. Draffin, Jr.
Senior Fellow, Advanced Nuclear
U.S. Nuclear Industry Council

Marcus Nichol
Senior Director, New Reactors
Nuclear Energy Institute

NEI/USNIC Part 53 2022 Survey Topics

Respondents' Characteristics (Q1-Q3)
Understanding and Support (Q4-Q6)
Benefits / Concerns / Opportunities (Q7-Q9)
Frameworks A & B and Licensing Approach (Q10-Q11)
Comparison to Goals for Part 53 (Q12-Q14)
Other comments (Q15)
QHO analysis
Comparison to 2021 USNIC Part 53 Survey
Concluding High Level Insights
Appendix

Q1: Companies Completing NEI/USNIC Part 53 Survey – April 2022

1. Alpha Tech
2. ARC Clean Energy
3. BWXT
4. Constellation
5. Energy Northwest
6. Framatome
7. GE-Hitachi Nuclear Energy
8. General Atomics
9. Holtec International
10. Kairos Power
11. Moltex Energy
12. NuScale Power
13. Oklo
14. Radiant Industries
15. Southern Company
16. TVA
17. TerraPower
18. UAMPS (Carbon Free Power Project)
19. Ultra Safe Nuclear Corp.
20. Westinghouse
21. X-energy
22. Xcel Energy

This **comprehensive** survey of Part 53 was sent to NEI/USNIC members that are potential applicants to the NRC.

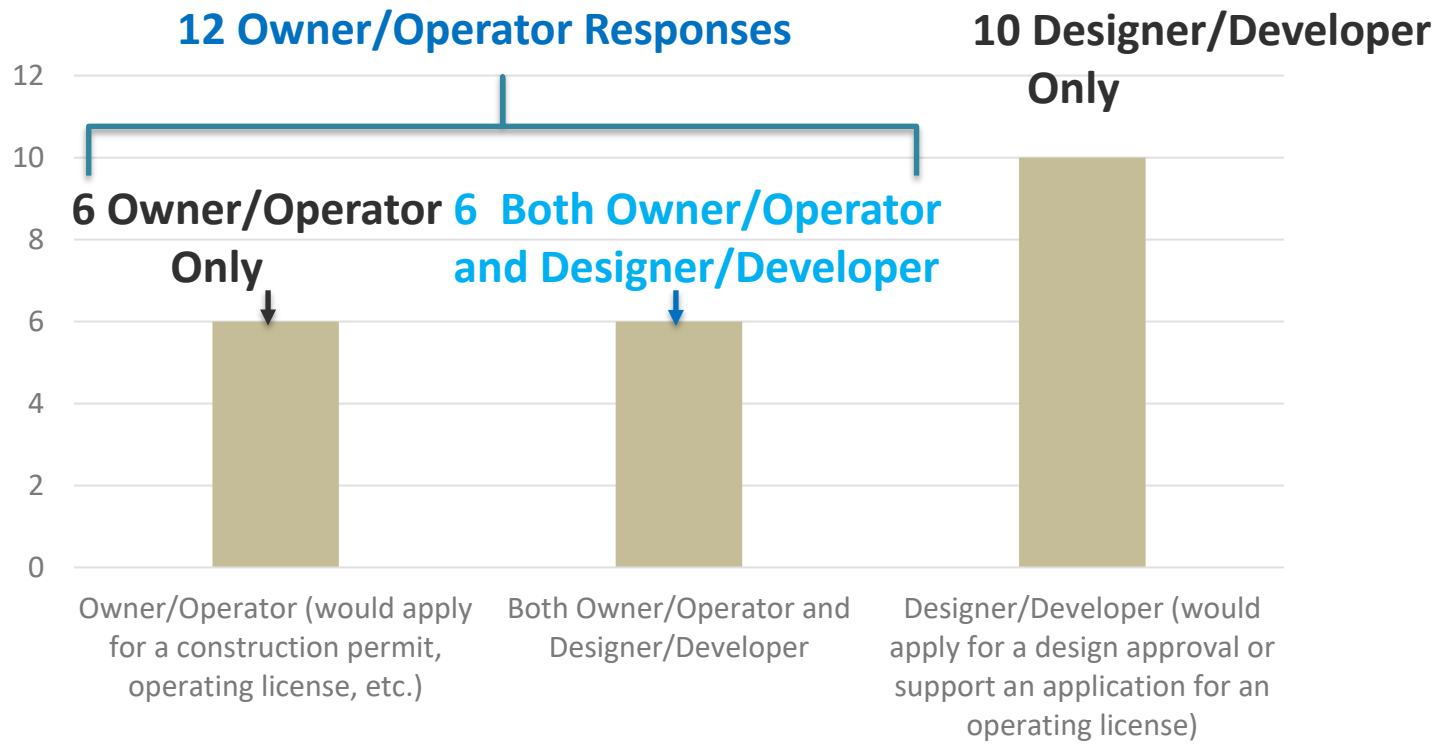
The survey was sent to senior regulatory affairs personnel (VP or Director) and represents the organization's perspective.

A few companies (not listed) declined to complete the survey, with the following reasons provided:

- Not sufficiently familiar with NRC Part 53 rulemaking
- Part 53 is not relevant, pursuing design approval under Part 52
- Not planning to deploy design in the U.S.

Q2: What type of applicant to the NRC are you? (Select all that apply)

Answered: 22 Skipped: 0



Q2: What type of applicant to the NRC are you?

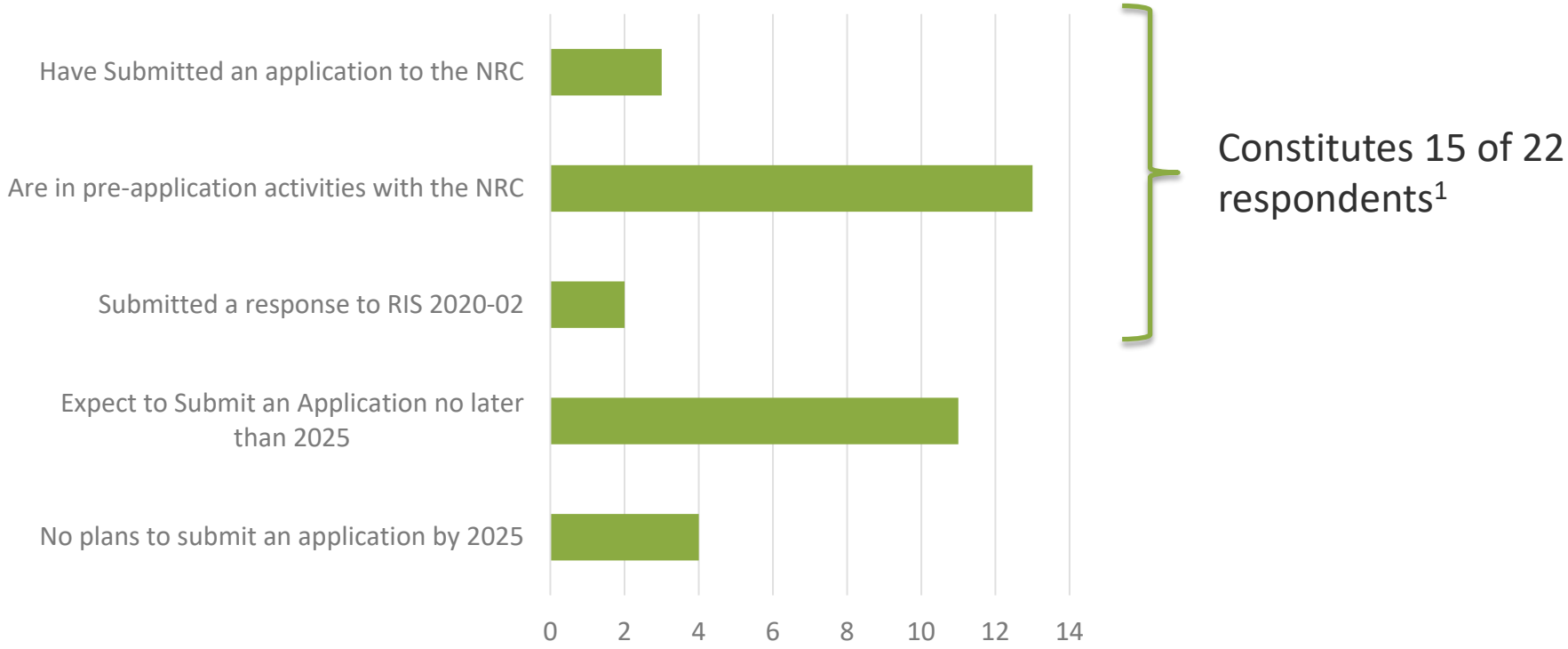
Key Insights from Comments[1]

1. Role of owner/operator and/or designer/developer may be project dependent
2. Interest in manufacturing license (which was not explicitly identified as a choice, but implied in developer/designer)

1) Note about Comments for all questions: These are formatted to draw out the main conclusions related to the particular question, rather than present the raw comments that sometimes contains ancillary perspectives.

Q3: How engaged are you with the NRC regarding current or future licensing applications? (Select all that apply)

Answered: 22 Skipped: 0



1) Note: Sum of bars is more than total respondents with these three categories, because multiple selections were allowed.

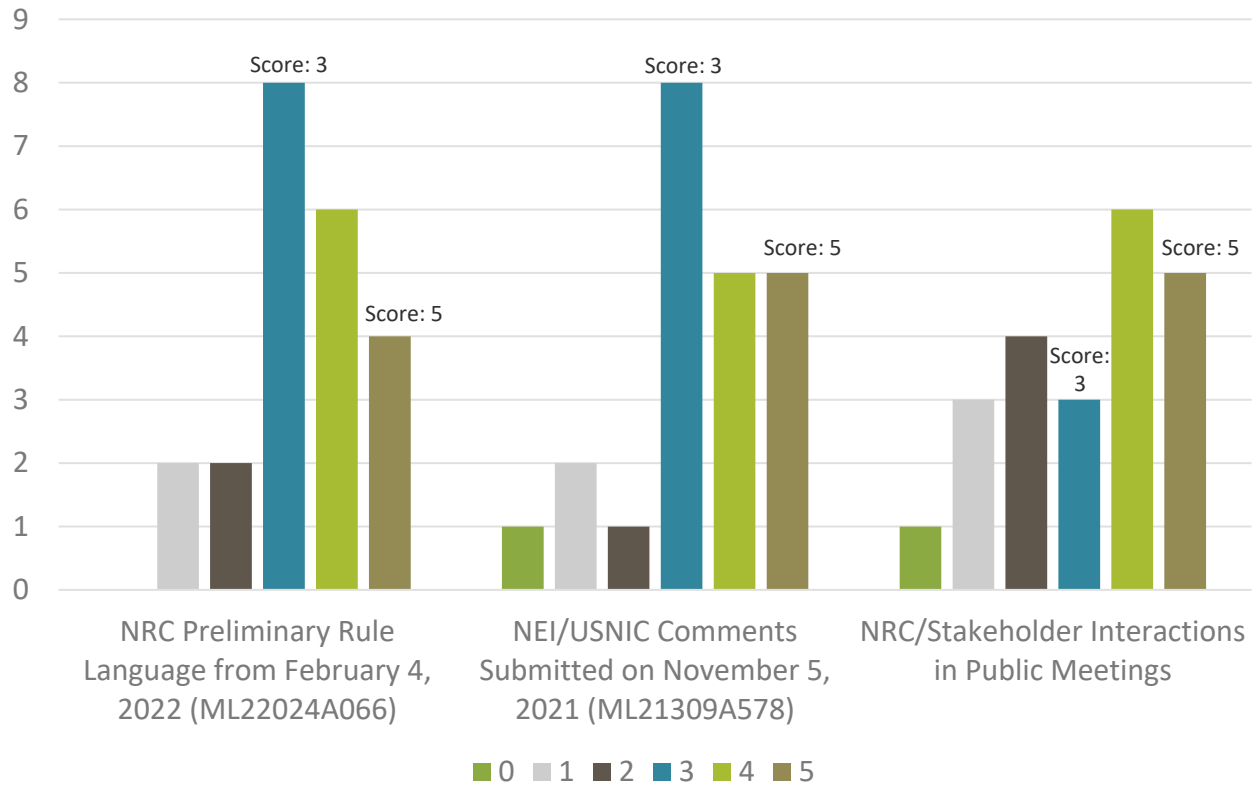
Q3: How engaged are you with the NRC regarding current or future licensing applications?

Key Insights from Comments

1. Many respondents have been engaged with the NRC for a long time in developing a modernized regulatory framework
2. Some designers/developers are not engaging the NRC until they have their first project (customer), but are working on their design.

Q4: What is your familiarity with each of the following? (score 0 to 5, with 5 being the most familiar)

Answered: 22 Skipped: 0



Rule and NEI/USNC Comments Content Familiarity

- **Very** (score 4 or 5) = 10
- **Somewhat** (2 or 3) = 10
- Not Very (0 or 1) = 2

Public Meeting Familiarity

- **Very** (4 or 5) = 9
- **Somewhat** (2 or 3) = 7
- Not Very (0 or 1) = 4

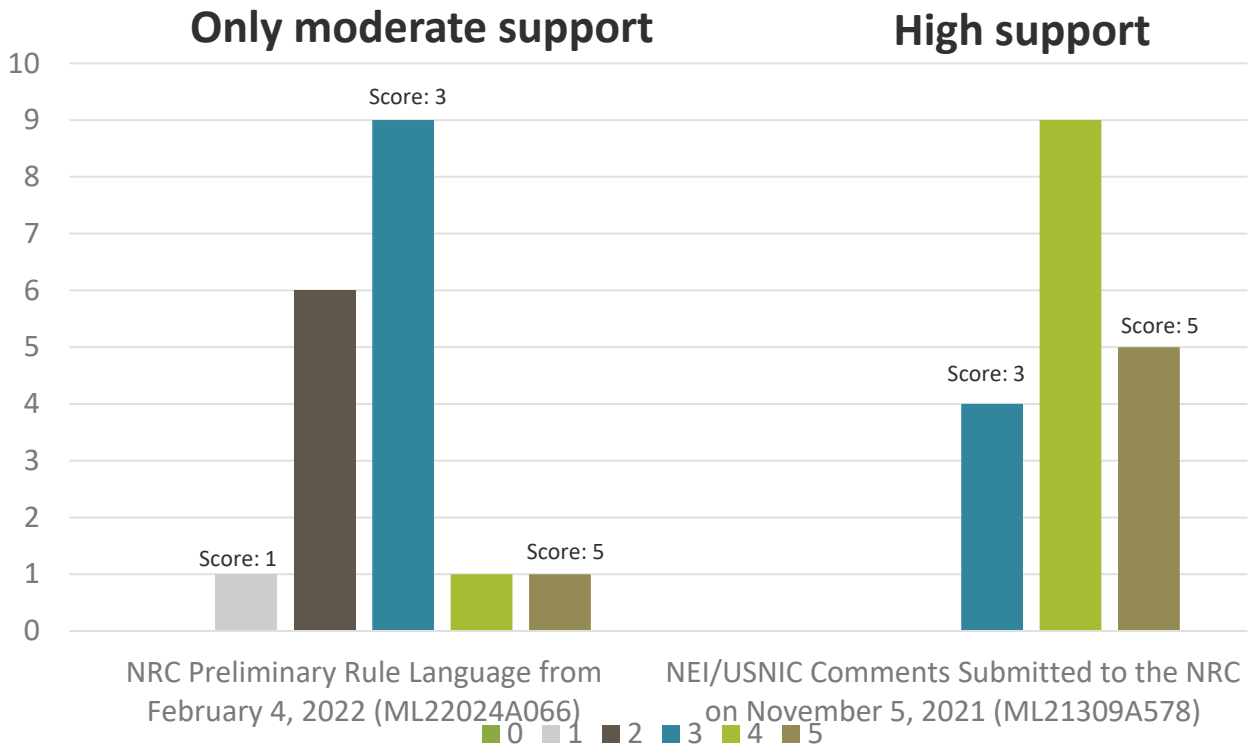
Q4: What is your familiarity with each of the following?

Key Insights from Comments

1. Respondents that had a low familiarity with rule and comments tended to be those that have not been involved in public meetings.

Q5: To what degree do you support the following? (score 0 to 5, with 5 being the most agreement)

Answered: 21 Skipped: 1



Degree of Support[1, 2]

NRC Draft Rule Language:

- High Support (score 4 or 5) = 11% (2)
- **Moderate Support** (score 2 or 3) = 83% (15)
- Low Support (1) = 6% (1)

NEI/USNIC Comments:

- **High Support** (score 4 or 5) = 78% (14)
- Moderate Support (score 3, not 2) = 22% (4)
- Low Support (no 0 or 1) = 0% (0)

1) Moderate support for NRC rule language is consistent with NEI/USNIC comments, in which NEI/USNIC support some of the NRC approaches, but have concerns in key areas.
2) Not shown are three "Don't Know" responses. Percentages are of those providing responses other than "Don't Know"/skip.

Q5: To what degree do you support the following?

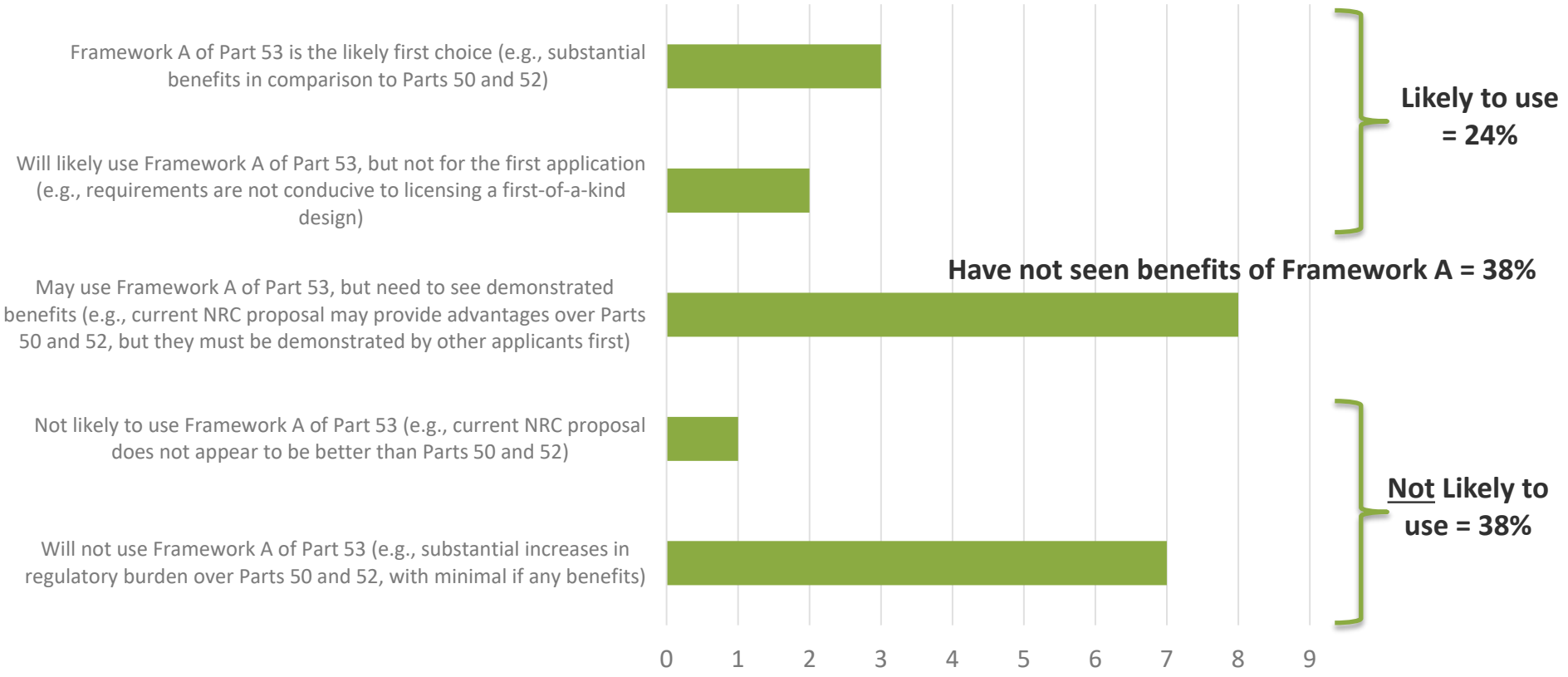
Key Insights from Comments[1]

1. Additional understanding of details of NRC's proposed approaches is needed (through statements of consideration and guidance) to fully know whether Part 53 will be usable.
2. Some believe there are a number of un-defined approaches, such as 53.450 "other generally accepted risk-informed approach".
3. Measuring support of NRC language as a whole does not reveal the nuances of complex rule. (e.g., parts of NRC language appear workable, but other parts are not workable - see NEI/USNIC comments).
4. Some identified specific needs for more efficiency – consistent with NEI/USNIC comments.

1) More insights are provided in responses to Question 12 regarding the efficiency of Part 53 to achieve the same level of safety as Parts 50 and 52.

Q6: For applications submitted in 2025 and beyond, what is the likelihood that you will use the NRC Part 53 Framework A, if the Final Rule adopts the language and approaches in its current form? (Note that later questions will ask about Framework B, and the overall two-framework approach)

Answered: 21 Skipped: 1



Q6: For applications submitted in 2025 and beyond, what is the likelihood that you will use the NRC Part 53 Framework A, if the Final Rule adopts the language and approaches in its current form?

Key Insights from Comments

The efficiency of Part 53 (as compared to Parts 50 and 52) to achieve the same level of safety is a determining factor in interest to use Part 53.

1. Many respondents don't plan to use Part 53
    a) Part 53 perceived to not be timely for deployment plans
    b) Part 50 and 52 approval is sufficient to achieve long term business/deployment plans and no incentive to switch to Part 53 later
    c) Part 53 perceived to be significant increase in regulatory burden (as compared to Parts 50 and 52) to achieve same level of safety
2. Many have not seen demonstrated benefits --are unsure due to too many uncertainties and untested processes, and need it to be demonstrated first.
3. A few believe Part 53 is more efficient, and are likely to use it.
4. Some that are not likely to use Framework A are hopeful that Framework B would be useable.
5. A potential licensee mostly interested in the burden placed on plant operations.

Q7: Which of the following areas of the current NRC preliminary language and approaches in Part 53 provide significant benefits over Parts 50 and 52? (score 0 to 5, with 5 being the most beneficial)

Answered: 20 Skipped: 2

Best at providing benefits

Part 53 Content	Most (4 or 5)	Least (0 or 1)	Don't Know
Increased use of performance-based approach for Security	**80%** (16)	0% (0)	10% (2)
Technology-inclusive requirements (e.g., safety functions, design criteria, design features)	**75%** (15)	5% (1)	10% (2)
Increased use of performance-based approach for Operators (e.g., certified operator option)	**60%** (12)	5% (1)	15% (3)
Increased use of performance-based approach for Fitness for Duty	**55%** (11)	5% (1)	15% (3)
Fewer exemptions will be required	42% (8)	5% (1)	**42% (8)**
Increased functionality for Manufacturing Licenses	32% (6)	0% (0)	21% (4)
Organization and structure of the rule (e.g., separation of design, analysis, operations, etc.)	30% (6)	0% (0)	20% (4)
Two frameworks (A and B) in rule based on role of PRA	26% (5)	16% (3)	21% (4)
Inclusion of Quantified Health Objectives in the Rule, rather than keeping as a Policy	21% (4)	47% (9)	11% (2)
Facility Safety Program	5% (1)	**32%** (6)	26% (5)

Q7: Which of the following areas of the current NRC preliminary language and approaches in Part 53 provide significant benefits over Parts 50 and 52?

Key Insights from Comments

1. Two-Frameworks (A and B)
    a) Some believe multiple frameworks make little sense, and a single framework that utilizes guidance for details for different approaches would be more appropriate.
    b) Some are in favor of using Framework B instead of Framework A, but not as written (likely referring to Part 5X that is expected to be basis for Framework B).
2. Facility Safety Program
    a) This program is untested so it is tough to know what the burden or value will be.
    b) Some believe licensee-led, industry-overseen framework for oversight of facility programmatic matters has some potential benefits in reducing regulatory burden without impacting safety; however, it is not clear that current NRC language will actually achieve greater efficiency.
3. Exemptions - Some believe what may be required to meet Part 53 is uncertain, and there was suggestion to leverage the Technology Inclusive Risk-Informed Configuration Evaluation (TIRICE) effort to develop 50.59-like process with clear performance criteria (53.895 was viewed as never-ending risk reduction measures).

Q8: How concerned are you about the following areas of the current NRC preliminary language and approaches in Part 53? (score 0 to 5, with 5 being the most concerned)

Answered: 20 Skipped: 2

Greatest concerns

Part 53 Content	Most (4 or 5)	Least (0 or 1)	Don't Know
Expanding ALARA to be a design requirement	**68% (13)**	0% (0)	5% (1)
Proliferation of duplicative and unnecessary programs	**68% (13)**	0% (0)	5% (1)
Increased regulatory burden for non-safety SSCs	**67% (12)**	11% (2)	6% (1)
Safety objectives that are different than those in the Atomic Energy Act	**63% (12)**	0% (0)	11% (2)
Expansion of design basis to include Beyond Design Basis Events	**61% (11)**	11% (2)	6% (1)
Lack of clarity in the purpose and application of some requirements	**58% (11)**	0% (0)	5% (1)
Lack of clear measurable goals for regulatory efficiency	**50% (10)**	5% (1)	15% (3)
Missed opportunity to integrate safety, security, EP and siting	**50% (10)**	6% (1)	20% (4)
Facility safety program	**50% (9)**	0% (0)	17% (3)
Inclusion of QHOs in the Rule, rather than keeping as a Policy	**50% (9)**	11% (2)	6% (1)
Lack of consistency in use of regulatory terminology (e.g., PDC vs FDC)	44% (8)	5% (1)	17% (3)
Lack of clarity on the safety paradigm	39% (7)	0% (0)	28% (5)
Only allowing an enhanced/leading use of PRA licensing approach	28% (5)	17% (3)	17% (3)
Two distinct frameworks (A and B) in the rule based on role of PRA	28% (5)	22% (4)	17% (3)

Q8: How concerned are you about the following areas of the current NRC preliminary language and approaches in Part 53?

Key Insights from Comments

1. Some believed it is difficult to measure the efficiency of Part 53 without working examples, and it is a judgment call at this point.
2. Some believed Part 53 efficiency needs to be considered for licensing of “fleets” of the same design, and not just licensing of design the first time.
3. Some believed efficiency should be considered for international deployments, e.g., alignment with IAEA language and guidance would make it more efficient to export designs approved by the NRC.
4. Some believe NRC has integrated safety, security, EP and siting too much, and scaling back to a Part 53 that simply removes LWR-specific requirements from Parts 50 and 52 would have been (and perhaps still could be) a more useful rule.

Q9: Which of the following innovations that the NRC is not pursuing would greatly enhance the value of Part 53? (score 0 to 5, with 5 being the most beneficial

Answered: 21 Skipped: 1

Part 53 Content	Most (4 or 5)	Least (0 or 1)	Don't Know
Streamlining of licensing reviews and regulatory approvals	**79%** (15)	0% (0)	5% (1)
Streamlining of program requirements	**68%** (13)	0% (0)	5% (1)
Treating ALARA as a Policy rather than requirements in the Rule	**67%** (14)	0% (0)	10% (2)
Streamlining of oversight and inspections	**65%** (13)	0% (0)	10% (2)
More performance-based and modern siting requirements	**60%** (12)	0% (0)	10% (2)
Integrating safety, security, emergency planning and siting	**57%** (12)	9% (2)	5% (1)
QA requirements that explicitly allow ISO-9001 for safety-related	**52%** (11)	0% (0)	10% (2)

Q9: Which of the following innovations that the NRC is not pursuing would greatly enhance the value of Part 53?

Key Insights from Comments

1. Streamlining of licensing reviews and approvals – Some believe NRC should include measurable improvements in schedule and costs.
2. Performance-based and Risk-informed – Some believe many requirements remain deterministic, e.g., Human Factors Engineering (which is the same whether or not the plant has risk-significant operator actions or not).
3. Oversight and inspections – Some noted concern that NRC has not even developed initial framework for advanced reactor oversight for Parts 50 and 52.

Q10: Which of the following Framework A approaches and preliminary rule language should, and should not, be incorporated into Framework B (Traditional use of PRA, and No use of PRA options)?

Answered: 13 Skipped: 9

Part 53 Content	Include in Framework B	Do Not Include
Increased functionality for Manufacturing Licenses	**92% (11)**	8% (1)
Organization and structure of the rule (e.g., separation of design, analysis, operations, etc.)	**90% (9)**	10% (1)
Technology-inclusive requirements (e.g., safety functions, design criteria, design features)	**85% (11)**	15% (2)
Increased use of performance-based approach for Security	**85% (11)**	15% (2)
Increased use of performance-based approach for Fitness for Duty	**83% (10)**	17% (2)
Increased use of performance-based approach for Operators (e.g., certified option)	**75% (9)**	25% (3)
Facility safety program	25% (3)	**75% (9)**
Expanding the design basis to include Beyond Design Basis Events	17% (2)	**83% (10)**
Proliferation of duplicative and unnecessary programs	15% (2)	**85% (11)**
Inclusion of Quantified Health Objectives in the Rule, rather than keeping as a Policy	15% (2)	**85% (11)**
Safety objectives that are different than those in the Atomic Energy Act	9% (1)	**91% (10)**
Increased regulatory burden for non-safety structures, systems and components (e.g., programmatic controls similar to those needed for safety-related SSCs)	0% (0)	**100% (13)**

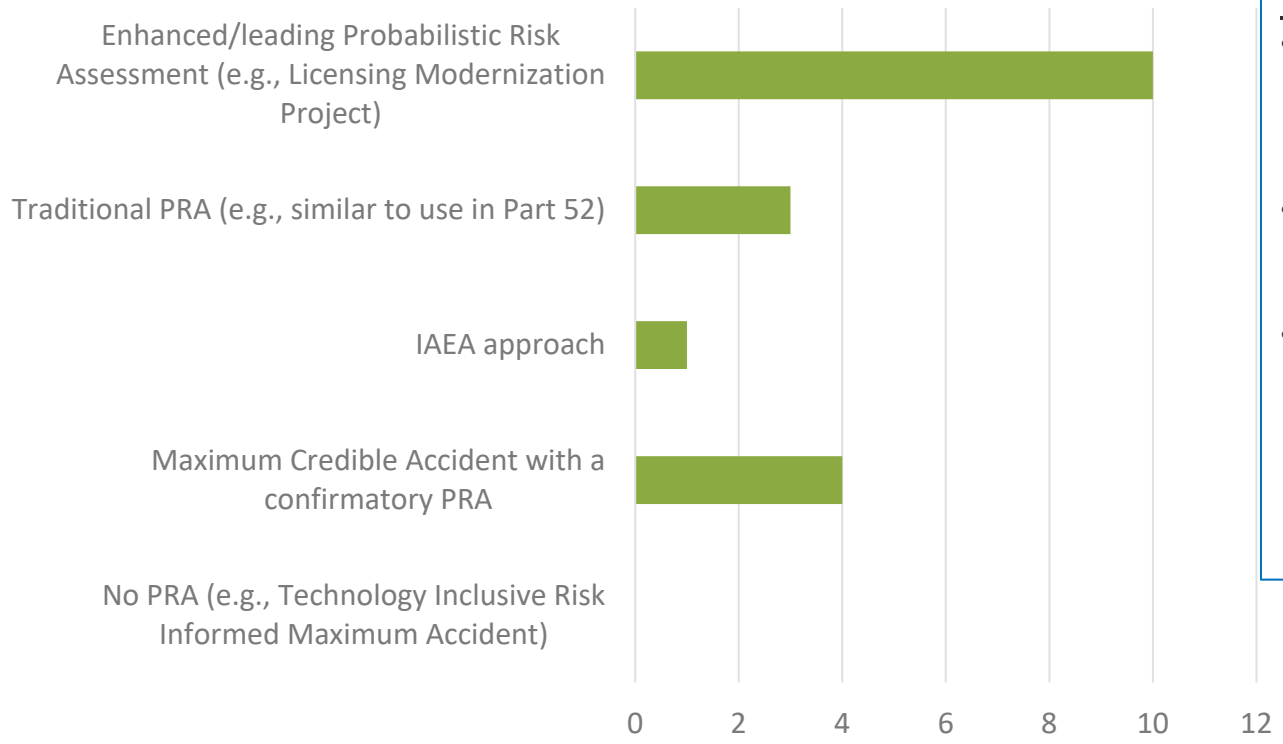
Q10: Which of the following Framework A approaches and preliminary rule language should, and should not, be incorporated into Framework B?

Key Insights from Comments

1. Some believe Framework B should share the performance-based technology-inclusive requirements of Framework A (e.g., safety functions, design criteria, design features)
2. Some believe additional requirements may need to be made performance-based technology-inclusive, and that there may need to be more consideration on how all requirements are technology-inclusive from a size perspective, not just from coolant perspective (e.g., Aircraft Impact Assessment and maintenance rule).
3. Some believe that the kinds of information may be similar regardless of reactor design (e.g., ranging from micro to large), but there should be graded approach to scope of such information in safety analyses, programs, etc.
4. Some potential owner/operators believed that licensing framework (either A or B) is not their concern, but is the concern for the designer/developer.

Q11: If you use Part 53, which type of licensing approach would you most likely use?

Answered: 22[1] Skipped: 0



Notes

- If Part 53 used, 46% (10 of 22) of respondents plan to use what NRC defines as an enhanced role of the PRA
- 36% (3+1+4=8) of respondents plan to use PRA in a way not permissible by current Framework A rule text
- Of remaining 18% (4 of 22), two do not plan to use Part 53, one does not care which approach is used, and one did not identify which approach (though they did say they are using a PRA)

1) Four responses were "Other", as described in side bar above.

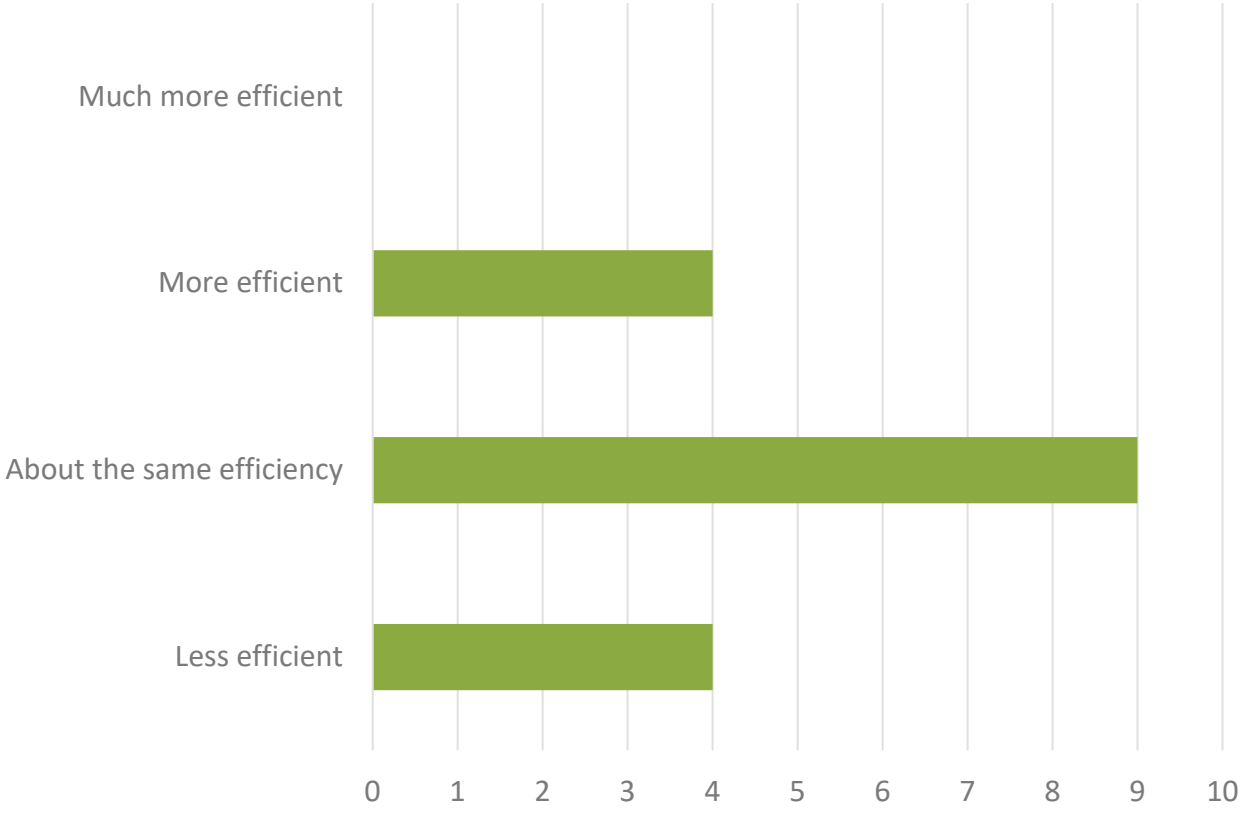
Q11: If you use Part 53, which type of licensing approach would you most likely use?

Key Insights from Comments

1. In terms of licensing, some believe that there is no fundamental difference among (1) enhanced PRA, (2) traditional PRA, and (3) IAEA.
   a) Identified that NRC has approved topical report for the implementation of NEI 18-04 that would not meet the NRC's definition/requirements for "enhanced/leading" PRA in Part 53.
   b) This seems to align with perspectives that Part 53 should be a single framework that allows range of uses of the PRA by focusing rule on performance criteria of the design, and utilizing guidance to focus on methods of evaluation (i.e., role and use of the PRA).

Q12: In achieving a similar level of safety, the overall efficiency of the current NRC Part 53 preliminary rule language, as compared to Parts 50 and 52, is:

Answered: 17 Skipped: 5



Q12: In achieving a similar level of safety, the overall efficiency of the current NRC Part 53 preliminary rule language, as compared to Parts 50 and 52, is:

Key Insights from Comments

1. Specific areas where respondents see reductions to efficiency.
    a) Some expressed concerns that while the safety objectives are performance-based, Part 53 imposes extensive burden on demonstrating compliance and corresponding NRC reviews, as well as through requirements for additional duplicative programs.
    b) Some questioned why Part 53 increases regulatory burden (to achieve similar level of safety) when designs being developed have much higher safety margins than plants previously approved by NRC.
    c) Some believe that neither Framework A or B will be more efficient for the first review of a design.
2. Specific areas where respondents see improvements to efficiency.
    a) Some appreciate Part 53 efficiency in obtaining a design certification after receiving operating license.
3. Measuring efficiency overall is difficult.
    a) Some see reductions in burden in some areas, but significant increases in burden in other areas.
    b) Some suggested getting experience with proposed rule through table tops in order to better understand whether it will be efficient.
4. Some believe Parts 50 and 52 are currently very inefficient in achieving current level of safety, and that there was great hope that NRC would have addressed those inefficiencies in Part 53. (See Question 9 for more details)

Q13: How well do you think the NRC has met the following goals, so far, for the Part 53 rulemaking? (score 0 to 5, with 5 being the most fulfilled)

Answered: 18 Skipped: 4

Goals that are <u>most</u> met by current preliminary Part 53 rule language

Part 53 Content	Most (4 or 5)	Least (0 or 1)	Don't Know
Continue to provide reasonable assurance of adequate protection (SECY 20-0032)[1]	**78%** (14)	0% (0)	11% (2)
Establish requirements that address non-LWRs (SECY 20-0032)	**50%** (9)	0% (0)	17% (3)
Safety Focused (industry goal)	44% (8)	0% (0)	17% (3)
Technology-inclusive (July 2021 Unified Industry Position letter)	44% (8)	0% (0)	17% (3)
Risk-informed (July 2021 Unified Industry Position letter)	33% (6)	6% (1)	22% (4)
Reduce requests for exemptions (SECY 20-0032)	33% (6)	17% (3)	28% (5)
Recognize technological advancements in reactor design (SECY 20-0032)	33% (6)	22% (4)	22% (4)
Credit the response of advanced reactors to postulated accidents (SECY 20-0032)	28% (5)	17% (3)	22% (4)
Flexible (industry goal)	22% (4)	11% (2)	17% (3)

Note: Many key goals (e.g. technology-inclusive, risk-informed & reduced exemption requests, flexible) received low scores (less than half 4 or 5) indicating key goals have not been demonstrated

1) Other comments expressed concern that the NRC has increased standards and regulations for public protection (e.g., Beyond Design Basis, ALARA, Programs) – see Q8.

Q13: How well do you think the NRC has met the following goals, so far, for the Part 53 rulemaking? (score 0 to 5, with 5 being the most fulfilled)

Answered: 18 Skipped: 4

Goals that are <u>least</u> met by current preliminary Part 53 rule language

Worst at meeting goals

Part 53 Content	Most (4 or 5)	Least (0 or 1)	Don't Know
Efficiency (July 2021 Unified Industry Position letter)	11% (2)	**39% (7)**	22% (4)
Promote regulatory stability, predictability and clarity (SECY 20-0032)	22% (4)	**28% (5)**	22% (4)
Clear (industry goal)	5% (1)	**22% (4)**	11% (2)
Usefulness (July 2021 Unified Industry Position letter)	11% (2)	**22% (4)**	22% (4)
Recognize confidence in licensee controls (July 2021 Unified Industry Position letter)	0% (0)	**17% (3)**	28% (5)
Requirements at a high level with utilization of guidance to address details (SRM-SECY-20-0032-ML19340A056)	17% (3)	17% (3)	28% (5)
Regulatory framework using methods of evaluation that are flexible and practicable for application to a variety of technologies (NEIMA)	11% (2)	11% (2)	11% (2)

Note: Many key goals (e.g. clear, efficient, useful) received very low scores (less than 20% 4 or 5, and many 0 or 1) indicating key goals have not been demonstrated

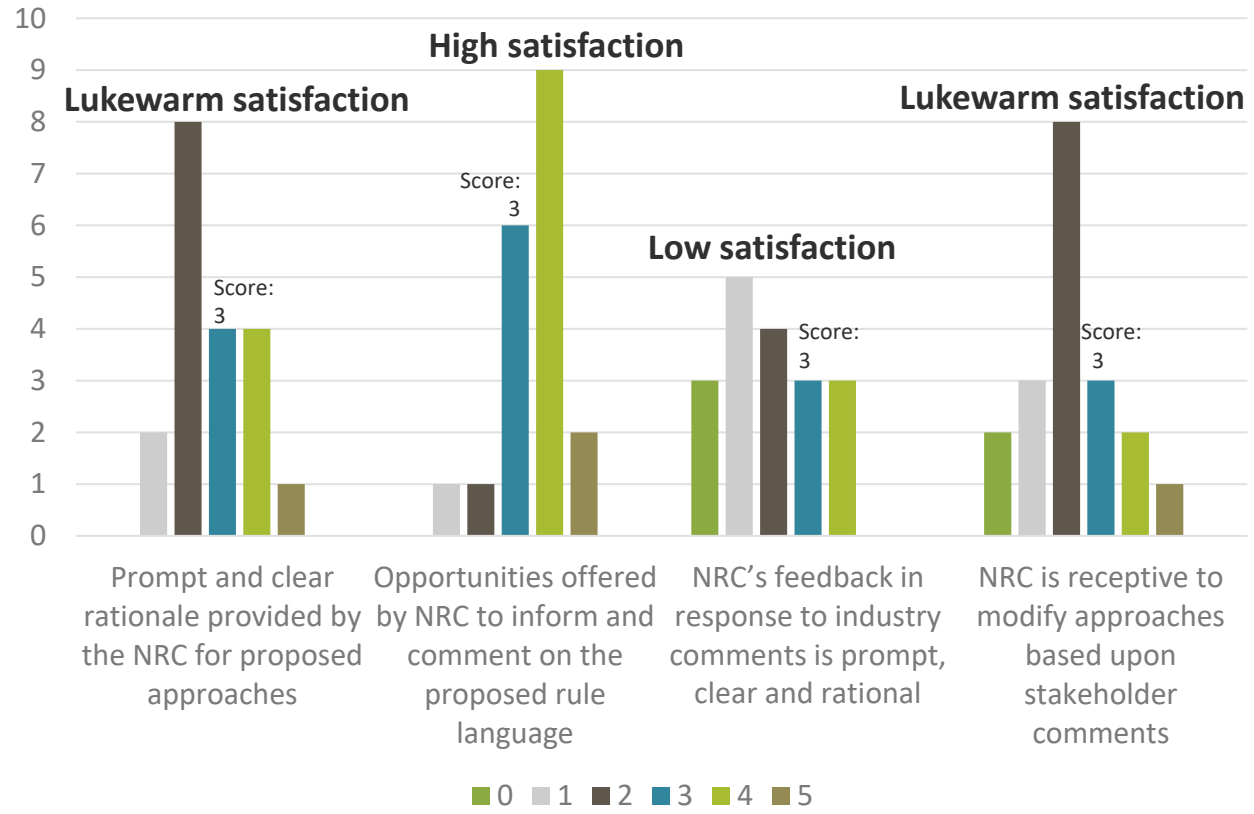
Q13: How well do you think the NRC has met the following goals, so far, for the Part 53 rulemaking?

Key Insights from Comments

1. Flexibility
    a) Some believe that a Part 53 rule with a single framework that allows for a variety of methodologies (with details for methods addressed in guidance) would be more flexible.
    b) Some understand purpose of the two framework approach is to increase flexibility; however, they believe the two-framework solution is compensating for a reduction in flexibility – compared to Parts 50 and 52 – in the original Part 53 (now Framework A) by only allowing a binary set of licensing approaches.

Q14: How satisfied are you with the NRC engagement with stakeholders on Part 53? (score 0 to 5, with 5 being the most satisfied)

Answered: 21 Skipped: 1



1) Not shown are three "Don't Know" responses. Percentages are of those providing responses other than "Don't Know"/skip.

NRC Engagement Satisfaction[1]

NRC Rationale for approaches
- High (score 4 or 5) = 5
- **Moderate (2 or 3) = 12**
- Low (0 or 1) = 2

Opportunities offered to inform/comment
- **High (4 or 5) = 11**
- **Moderate (2 or 3) = 7**
- Low (0 or 1) = 1

NRC Feedback on industry comments
- High (4 or 5) = 3
- **Moderate (2 or 3) = 7**
- **Low (0 or 1) = 8**

NRC Receptivity to Input
- High (4 or 5) = 3
- **Moderate (2 or 3) =11**
- Low (0 or 1) = 5

Q14: How satisfied are you with the NRC engagement with stakeholders on Part 53?

Key Insights

1. Many did not feel NRC is receptive to making changes to address feedback.
    a) NRC has said that they will not respond to or resolve comments.
    b) NRC appears open to receiving comments, but has made few changes (e.g., incorporation of non risk-based approach) in the draft language to address them.
    c) NRC has not addressed some feedback (e.g., QHOs in the rule rather than as policy), and there should be an expectation that the NRC provides detailed reasons they aren't addressing feedback that has consistently expressed significant concerns.
2. Many believe sharing NRC draft rule text early in the process is useful in helping potential users of a new rule to fully understand and comprehend potential improvements or challenges with the rule (e.g., in order to assess whether it is potentially relevant to their business/deployment plans).

Q15: Other comments on Part 53

Key Insights from Comments

1. Some identified concerns that NRC's language does not achieve the goals of NEIMA for efficiently regulating advanced reactors, so that they can be a solution for climate change.
    a) Part 53 needs to give more consideration to efficient licensing of dozens of plants with a standardized design, and not just efficiency of licensing a design once.
    b) For applicant using NEI 18-04 licensing approach, Part 53 does not seem onerous, but it also does not appear to have clear gains in regulatory efficiency for licensing and regulation of advanced reactors.
2. Some had suggestions for improvements
    a) Even if Part 53 rule language addresses concerns, NRC still needs to implement an efficient licensing process.
    b) NRC should minimize burden of additional requirements of utilizing Part 53 in comparison to Parts 50 and 52, such as requirements for ALARA and the Facility Safety Program.
    c) Ensure IAEA approach is an integrated option (currently it appears to be secondary consideration in Framework B).
3. In rule's current state, it is unclear how to assess value of Framework B (only Part 5X has been released); however, this language is interesting for cases where maximum hypothetical/credible approach may be used.
4. There was suggestion for NRC's next steps:
    a) The NRC needs to (1) issue rule language, (2) entertain and resolve industry comments, and (3) support one or two applicants with different designs in use of Part 53 to establish precedents. This exercise must be free or a reasonable (nominal) charge to the applicant.

Topic Analysis: QHO's in the Rule (1 of 3)

For Q7, four respondents with score 4 or 5 for significant benefits of including QHOs in Framework A:

Plans to use Framework A	Plans to submit	Type of application	Type of applicant
First Choice	No plans to submit	Enhanced PRA	Owner/operator and design/developer
Not sure	Expect to submit applications by 2025	Traditional PRA	Owner/operator and design/developer
Will likely not use because Part 53 is not timely	Expect to submit applications by 2025	Enhanced PRA	Owner/operator and design/developer
Little confidence Part 53 will be effective by 2025	Expect to submit applications by 2025	No preference on use of PRA	Owner/operator only

Topic Analysis: QHO's in the Rule (2 of 3)

For Q7, nine respondents with score of 0 or 1 with no or very limited benefits of including QHOs in Framework A:

Plans to use Framework A	Plans to submit	Type of application	Type of applicant
First choice	Expect to submit applications by 2025	MCA with PRA	Designer only
Likely to use	In pre-application	MCA with PRA	Designer only
Likely to use	No plans to submit	Enhanced PRA	Designer only
May use	Expect to submit applications by 2025	Enhanced PRA	Owner and designer
May use	Expect to submit applications by 2025	Enhanced PRA	Designer only
May use	Expect to submit applications by 2025	IAEA Approach	Designer only
May use	Submitted RIS response	MCA with PRA	Designer only
Not likely to use	Expect to submit applications by 2025	MCA with PRA	Owner and designer
Not likely to use	In pre-application	Will use PRA but did not specify which approach	Owner and designer

Topic Analysis: QHO's in the Rule (3 of 3)

Key Takeaways

1. Very few (4) want QHOs in the rule, and of those
   a) Only 1 plans to use Framework A
   b) Only 2 plan to use enhanced PRA approach
2. Many (9) do not want QHOs in the rule, and of those
   a) Most (7 of 9) are likely to use, or considering using, Framework A
   b) All plan to use PRA, and 3 plan to use enhanced PRA
3. Perspective on QHOs in the rule does not have statistical dependence on whether they are owner/operator or designer/developer

Comparison of 2022 Part 53 Industry Survey to 2021 Part 53 Industry Survey

Scope

- 2022 NEI/USNIC: 16 developer/designers (6 also owner/operators) and 6 only owner/operators
- 2021 USNIC: 22 developer/designers (some also owner/operators)

Similarities

- Mostly dissatisfied with Part 53 language; some somewhat satisfied *(slight improvement vs. 2021)*
- 35-40% plan on using significant PRA input (similar to LMP/Framework A); majority do not
- Most (2/3) oppose QHO in rule

Differences

- 2022 survey has quantitative assessments of benefits and concerns *(similar benefits/concerns vs. 2021 survey but 2022 survey quantified concerns like expanding ALARA as design requirement)*

Concluding High Level Insights (1 of 2)

- Comprehensive survey
  - 12 owner/ operator responses and 10 designer/developer only responses
  - Key active organizations provided responses-- 15 of 22 respondents have submitted application to NRC, are pre-app with NRC, or submitted RIS response to NRC
- Support for, and interest in using, Part 53 is directly related to perceptions of whether Part 53 will be more efficient than Parts 50 and 52 in achieving same level of safety
- Strong support for NEI/USNIC comments is consistent with some support for NRC Part 53 rule language; NEI/USNIC comments supported some NRC approaches but presented significant concerns overall
- Ten Part 53 items create significant concerns (e.g. expanding ALARA to be design requirement, proliferation of unnecessary programs, increased regulatory burden for non-safety SSCs, and safety objectives different than in AEA)
- Four Part 53 items have benefits (e.g. increased use of performance-based approaches for security, and technology-inclusive requirements)

Concluding High Level Insights (2 of 2)

- Innovations needed included streamlining of licensing reviews, regulatory approvals and program requirements
- Input provided to assist NRC in determining what in Framework A should-- and should not-- be included in Framework B (Industry still prefers a single flexible framework)
  - Diversity in use of PRA and type of licensing approach to be used
- Most do not want QHOs in the rule (3 are likely to use and 4 may use Framework A); very few want QHOs in rule (1 likely to use Framework A and 1 undecided) – all plan to use PRA
- Many goals for Part 53 are not met by current language, but some goals are met
  - Not met: Improving regulatory efficiency, predictability, stability, clarity, and flexibility
- Part 53 development and review is time-consuming process, but only limited support for current language, and many areas where improvements needed to address concerns
  - Lukewarm satisfaction for NRC rationale for proposed approaches and receptivity to stakeholder response
  - High satisfaction with opportunity to comment, but low satisfaction on NRC's feedback to industry

Nuclear Energy Institute and U.S. Nuclear Industry Council 2022 Part 53 Survey

For questions contact

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Appendix:
Selective Part 53 Slides from Results of U.S. Nuclear Industry Council 2021 Advanced Nuclear Survey

(presented at 26 August 2021 NRC Advanced Reactor Stakeholder Meeting)

2021: Advanced Nuclear Developers Completing 2021 USNIC Advanced Nuclear Anonymous Survey

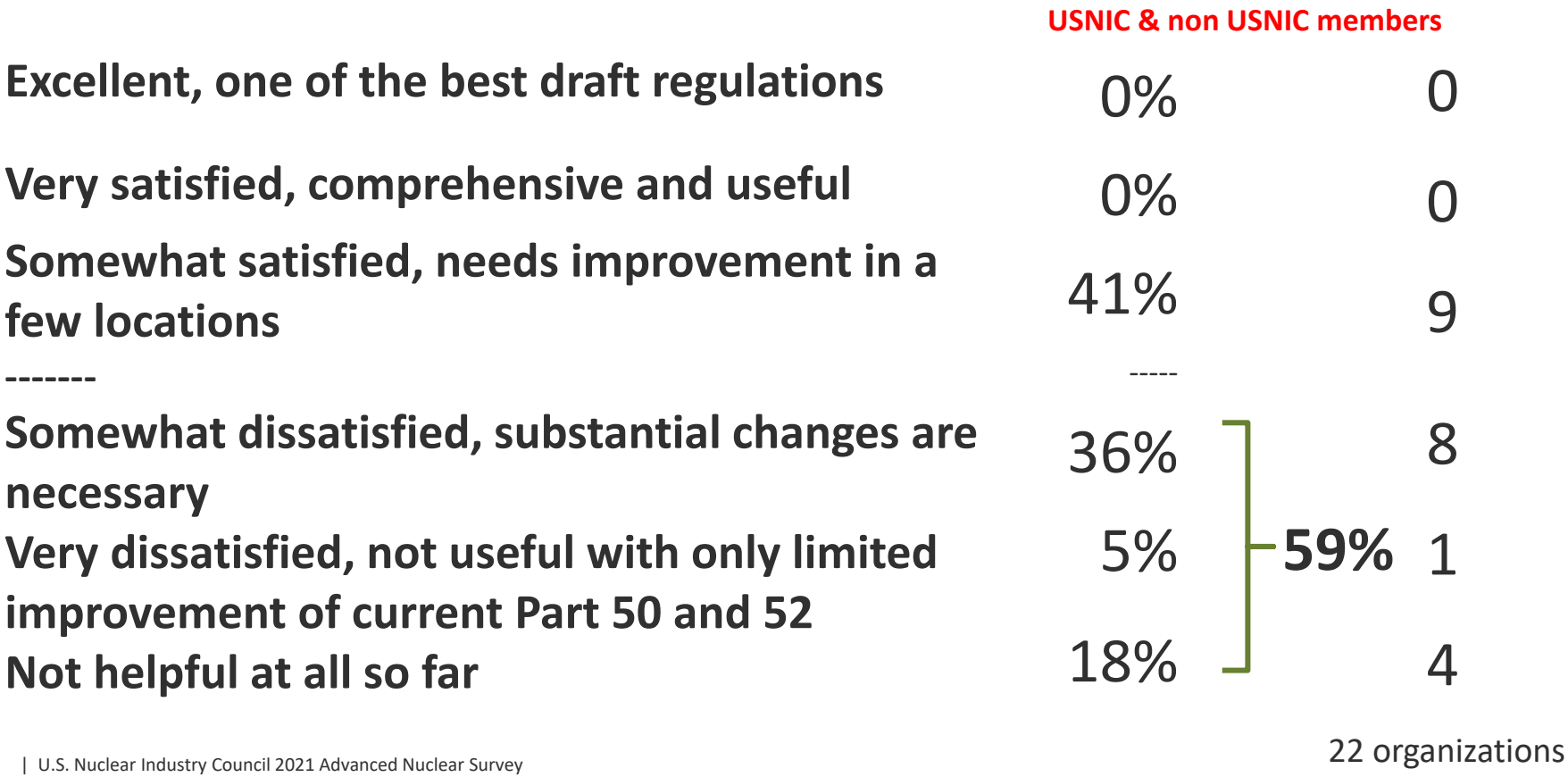
Advanced Reactor Developers: USNIC members (17)
Advanced Reactor Concepts
BWXT
Centrus
Framatome Inc.
GE Hitachi Nuclear Energy
General Atomics
Kairos Power, Inc
Lightbridge
MUONS Inc.
NuScale Power
Oklo Inc.
TerraPower
Terrestrial Energy
Ultra Safe Nuclear Corporation
URENCO (U-Battery)
Westinghouse Electric Company
X-energy

Advanced Reactor Developers: Non USNIC members (7) (Part 53 only)
Columbia Basin Consulting Group
Flibe Energy
Holtec
Hybrid Power Technologies
MIT (HTGR)
Southern Company (molten chloride reactor)
Thorcon

Note: This is **comprehensive** survey with **large sample size** of US developers:

- All answers include 100% (1 company, Oklo) in NRC licensing review, 100% (2 companies, X-Energy & TerraPower) with DOE ARDP Demo awards, 60% (3 of 5 companies) with DOE risk reduction awards, and over 80% (5 of 6 companies) of microreactor developers
- For Part 53 questions, survey includes 100% of DOE ARDP Demo, Risk Reduction, and ARC-20 awardees (all 10 organizations). Also, USNIC member and non-USNIC member organizations representing 75% (21 of the 28) non-Light Water Reactor (LWR) designs responded to survey, as well as LWR Small Modular Reactors companies (e.g. NuScale).

2021 Q7: How satisfied are you with the usefulness of Part 53 based on current (ML21148A062) language and explanations provided by NRC



2021 Q8: Comment on Part 53 issues – PRA

		USNIC & non USNIC members
We plan on using significant PRA input (similar to LMP)	**35%**	6
We plan on using medium PRA input (similar to existing regulatory framework)	24%	4
We plan on using minor PRA input (similar to maximum credible accident approach)	29%	5
We plan on taking another licensing methodology approach	12%	2
		17

Note: (a) Only 35% plan on using significant PRA input; 65% plan to use medium/minor/no PRA input.
(b) Parenthetical similarities present an example– a developer using LMP may use PRA consistent with existing regulatory framework in terms of what goes into the application.
(c) Future discussion will be required as NRC presents Graded PRA approach, recognizing only a minimal PRA may be appropriate at the Construction Phase.

2021 Q8: Comment on Part 53 issues – QHO in rule

		USNIC & non USNIC members
Yes, Include quantitative health objectives	36%	5
No, do not include quantitative health objectives	**64%**	9
		14

Comments:

- Include quantitative health objectives only if guidance is available to demonstrate how to meet and is only an initial licensing requirement
- Subpart H is of interest to our company to expand the available options for phased/progressive licensing of designs and projects
- What we plan to do in near-term implementation should not be driver for content of the rule if it is going to make it prescriptive for all technologies

NuScale Lessons Learned
(Omid Tabatabai-Yazdi)

Periodic Advanced Reactor Stakeholder Meeting

NRC Staff's Lessons Learned from the Review of NuScale Design Certification Application

Omid Tabatabai

May 11, 2022

Presentation Topics

- Background
- Best Practices
- Challenges during the Review
- Recommendations for Future Applicants
- Recommendations for the NRC Staff
- NuScale Letter to NRC - Recommendations for the NRC Staff
- NEI Letter to NRC - Recommendations for the NRC Staff
- Questions/Comments

Background

- In August 2020, staff completed its safety and environmental reviews of NuScale DCA and met the established public 42-month schedule (ahead of schedule by two weeks).
- In November 2020, NRR kicked off a lessons learned effort to identify (1) best practices, (2) areas for improvement, and (3) recommendations for improving future new reactor licensing reviews.
- Overall, the Staff's Lessons Learned Report (ML22088A161) found that the staff conducted the review in accordance with the NRC's Principles of Good Regulation, however, there are opportunities for continuous improvement.
- The lessons learned report is a proactive and forward-looking document that the staff intends to utilize in review of future applications.

Best Practices

1. Strong pre-application engagements
2. Focus on highly challenging issues
3. Continue to streamline the process for SERs
4. Encourage applicants to identify unique areas of the design that deviate from traditional compliance approaches (e.g., “Regulatory Gap Analysis”)
5. Use of topical reports for novel design features
6. Use risk-informed approaches to facilitate reaching safety determinations.
7. Disciplined approach to issuing RAIs
8. Increased use of technology to facilitate more efficient development SER
9. Conduct NRC staff audits in areas involving FOAK design features and use of eRR
10. Early NRC senior management review of SER
11. ACRS’s focus on reviewing only risk-significant and novel design attributes
12. Continuity of the technical, project, and legal reviewers

Challenges during the Review

Most significant review challenges, and areas for improvement, fell into the following four overarching categories:

1. Design finalization at application and changes during licensing
2. Holistic risk-informed review strategy
3. RAIs/audit enhancements
4. Schedule/resource management

Recommendations for Future Applicants

1. At the beginning of the licensing review, applicants should identify all design aspects that are still undergoing finalization, testing, or analysis or that are otherwise subject to change, especially if these deviate from discussions between the applicant and the NRC during preapplication meetings.

2. At the beginning of a licensing review, and potentially during preapplication, the applicant should prepare and present to the NRC staff its approach to performing its risk assessment and the key conclusions. This should include sufficient detail and completeness for the NRC staff to reach early conclusions on the relative risk significance of various aspects of the design.

3. Applicants should review NRC RAIs and audit plans and promptly raise any concerns and request clarification calls as necessary. Additionally, applicants should meet commitments for RAI responses and communicate any anticipated delays early. Applicants should acknowledge the impact of delays on the review schedule and resources.

Recommendations for NRC Staff

1. Establish an interdisciplinary review team to prioritize early engagement and dedicate resources to timely decision making on the applicant's risk insights. Additionally, the NRC should use this information to conduct an integrated and holistic review of the design, develop schedules, and allocate resources.

2. Evaluate the information provided by the applicant to ensure schedules and resources are appropriately allocated. Conduct an early assessment of the potential risk-significance of these areas and discuss with the applicant any potential impacts on schedules or resources.

3. Ensure that RAIs and audits conform to NRC guidance and assess whether there are more efficient means to gather the information.

4. Continue to achieve safety through transformative efforts in how we plan, schedule, and manage resources. Be transparent with applicants on performance, including identifying early any challenges to meeting our goals whether as a result of applicant decisions (e.g., design changes) or NRC performance.

NuScale Letter to NRC - Recommendations for the NRC Staff

NuScale – Letter dated February 19, 2021 (ML21050A431)

- Establish an appeal process to resolve disagreements between applicants and the NRC staff with respect to preliminary interpretations of requirements and guidance. (The staff does not agree)
- Implement risk-informed decisionmaking consistent with SRM SECY 19-0036. (The staff agrees)
- Define “credible”. (The staff partially agrees)
- Rely on downstream requirements (App. B, ITAAC, ASME Code, etc.) as part of NRC safety findings (The staff partially agrees)
- Clarify the role of the ACRS (The staff partially agrees)

NEI Letter to NRC - Recommendations for the NRC Staff

NEI – Letter dated June 9, 2021 (ML21160A246)

- Establish More Reasonable Review Duration and Cost Targets (The staff agrees)
- Improving Efficiency in the Review Process (The staff agrees)
- Realign on the appropriate level of detail and content of applications (The staff agrees)
- Implement a clearly defined appeal process (The staff does not agree)
- Open communication and alignment on project scope and plan (The staff agrees)
- Reinforce audit best practices (The staff agrees)
- Clarify the Role of the ACRS (The staff partially agrees)

QUESTIONS/COMMENTS?

Development of 50.59 guidance (Michael Tschiltz)

NRC Advanced Reactor Stakeholder Meeting

Technology - Inclusive Risk - Informed Change Evaluation (TIRICE)

May 11, 2022

Mike Tschiltz, Project Team Leader, Consultant to Southern Company
Steve Nesbit, LMNT Consulting, Lead for White Paper
Justin Wheat, Enercon, Lead for Tabletop Exercises

Southern Company

Meeting Agenda

Topics

- Project Overview, Objectives and Schedule
- Options for the implementation of the guidance
- Overview of White Paper
- TIRICE Process for 10 CFR 50.59 Change Evaluation
- Outline of White Paper
- Issues for Discussion
- Table Top Exercises
- Questions

Project Overview, Objectives and Schedule

Overview

Phase 3, (TIRICE portion) of the utility led Licensing Modernization Project (LMP), is intended to build upon the work accomplished by the prior LMP activities (Phase 1, NEI 18-04 and TICAP Phase 2, NEI 21-07) to create guidance for evaluating changes to the facility as described in the UFSAR for those licensees that have used LMP (NEI 18-04 and NEI 21-07).

- Advanced non-LWRs may elect to follow NEI 18-04 for selection of licensing basis events; safety classification of structures, systems, and components and associated special treatments; and determination of Defense-in-Depth (DID) adequacy.
- The resulting LMP-based affirmative safety case is substantially different from the traditional deterministic, compliance-based safety cases in place for LWRs licensed by the NRC.
- During development of TICAP guidance it became clear that there is a need to develop technology-inclusive, risk-informed guidance for evaluating changes to a facility as described in the Updated Final Safety Analysis Report (UFSAR) (10 CFR 50.59).
- The attributes of the LMP-based affirmative safety case require additional guidance for efficient application of 10 CFR 50.59 or alternative change evaluation process.

Project Overview, Objectives and schedule

Project will develop guidance for implementation of change evaluation for Advanced Non-LWRs that are licensed under 10 CFR Part 50 or 52 that utilize NEI 18-04 to develop safety case and NEI 21-07 guidance to determine application content.

The objectives of the guidance include:

- Provide regulatory confidence that the threshold for prior regulatory review and approval of changes will be effectively established and efficiently managed;
- Minimize the unnecessary burden to the regulator and operators for determining if changes require a license amendment; and
- Establish a clear understanding and process for how the criteria for making changes without prior NRC approval may be met.

Project Overview, Objectives and Schedule

Schedule

✓Develop guidance to be endorsed by NRC
- Draft document to be provided for the NRC for review in August 22
- NRC review and endorsement FY23

✓Project Plan developed and Project Team established (Dec-Jan 22)

✓Scope and Process papers (Feb-Mar 22)
- Utilized as inputs to white paper

❑White Paper (Apr-June 22)
- × Identify specific steps to be performed during the change evaluation process
- × Summarize efforts to date and obtain ARRTF feedback (April 25 – May 2)
- × Provide draft white paper to NRC for review (May 6)
- × Meeting with NRC to describe white paper content (May 11)
- ❑ NRC comments (May 20)
- ❑ Meeting to discuss comments and proposed responses (TBD)
- ❑ Revise White Paper and use to conduct Table Top exercises

Project Overview, Objectives and Schedule

Schedule (cont.):

✓Develop Table Top Guidelines and Objectives (Apr-June 22)

- ❑ Develop Annotated Outline for Guidance (Apr - Jun)
- ❑ Conduct Tabletop Exercises (Jun - Jul)
  - Conduct Table Tops with 2 Advanced Reactor Developers
  - Develop Lessons Learned and incorporate into white paper revision
- ❑ Develop Southern Co. guidance document (Jul – Aug)
- ❑ Convert to NEI document and submit for formal NRC review and endorsement (FY 23)

Options for the implementation of the guidance

There are **2 options** being considered for implementing this guidance.

Option 1: Develop a process and associated guidance, for an advanced non-LWR that has utilized NEI 18-04 and NEI 21-07, for evaluating if a proposed change, test or experiment requires prior NRC approval via license amendment under 10 CFR 50.90.

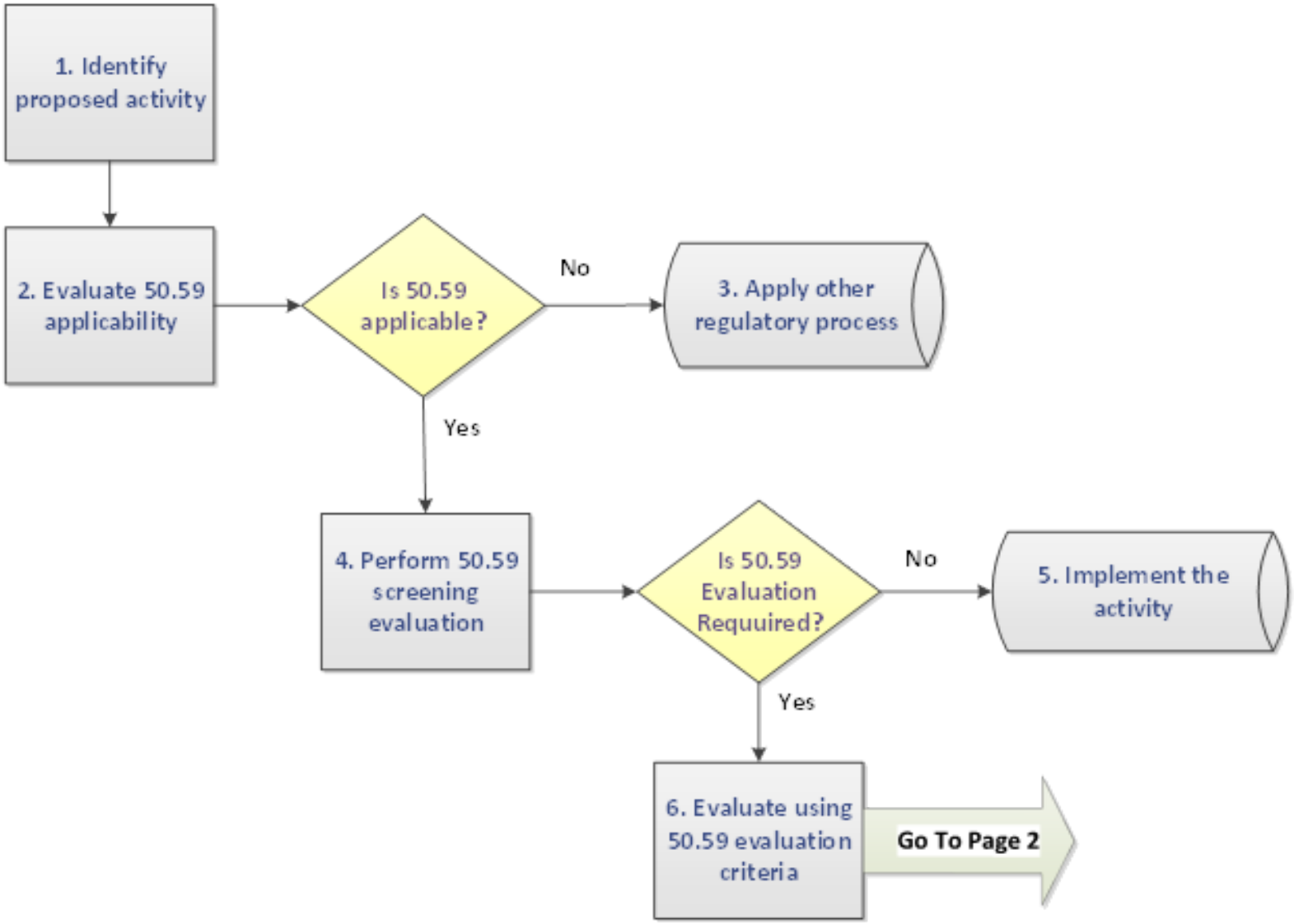
This process is envisioned to be implemented via: 1) a license condition to incorporate by reference the guidance that will be approved by the NRC and 2) an exemption to 10 CFR 50.59 to ensure clarity that 10 CFR 50.59 does not apply.

Option 2: Develop the same process and proposed guidance and use it with endorsement by the NRC that it is an acceptable means of implementing 10 CFR 50.59

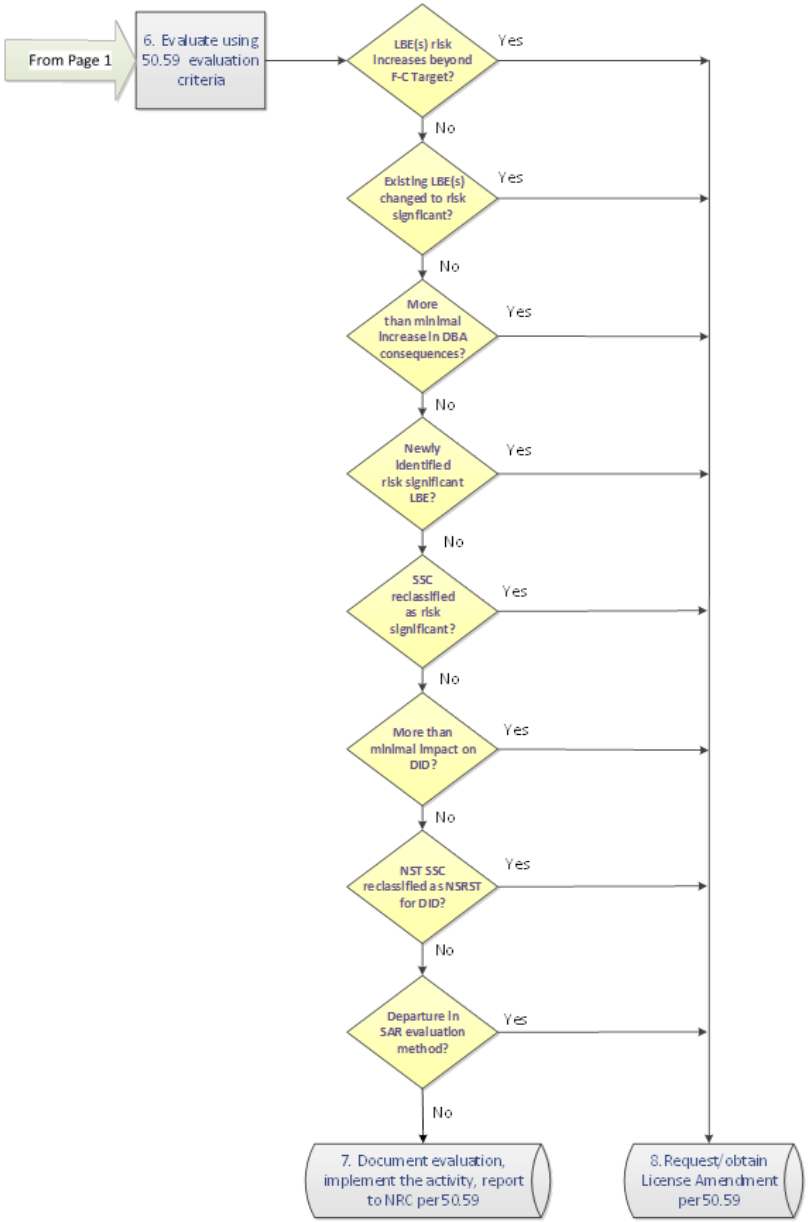
Overview of the White Paper

- Goal: Document the proposed approach to change control guidance in order to
  - Facilitate socialization with industry
  - Obtain feedback from NRC
  - Support tabletop exercises
- Approach: Build off of existing 10 CFR 50.59 guidance in NEI 96-07 by addressing differences for an advanced non-LWR following NEI 18-04 (Licensing Modernization Project or LMP)
  - Retain and use as much of the NEI 96-07 structure and guidance as possible
  - Focus on areas in which NEI 18-04 and NEI 21-07 enable focused and efficient approaches to change control
  - Guidance can be tailored to either implementation option

TIRICE Process for 10 CFR 50.59 Change Evaluation



TIRICE Process for 10 CFR 50.59 Change Evaluation (cont.)



Outline of the White Paper

- Chapter 1: Introduction (including background)
- Chapter 2: Addresses NEI 96-07 Chapters 1-3 (Introduction, Defense-in-Depth Philosophy, and Definitions)
- Chapter 3: Addresses NEI 96-07 Chapter 4 (Implementation Guidance) with specific sections on
  - Applicability
  - Screening
  - Evaluation
- Chapter 4: Addresses NEI 96-07 Chapter 5 (Documentation and Reporting)
- Chapter 5: Summary

Issues for Discussion

- Treatment of NEI 18-04 licensing basis events (LBEs) as “accidents evaluated in the SAR”
  - Includes anticipated operational occurrences (AOOs), design basis events (DBEs), beyond design basis events (BDBEs), and design basis accidents (DBAs)
- Treatment of NEI 18-04 Required Safety Functions as “design bases functions”
- Treatment of NEI 18-04 Required Safety Functions, risk-significant functions, and safety functions required for adequate DID as “design functions”
- Treatment of NEI 18-04 safety related and non-safety-related with special treatment (NSRST) structures, systems and components (SSCs) as “important to safety SSCs”
- Use of specific NEI 21-07 SAR sections to identify functions and SSCs

Issues for Discussion (cont.)

- Applicability
  - Changes to the probabilistic risk assessment (PRA) not subject to 10 CFR 50.59 but addressed by non-LWR PRA Standard
    - » Changes to methods of evaluation for AOOs, DBEs, and BDBEs are part of the PRA and therefore not subject to 10 CFR 50.59
  - Changes to state of knowledge not subject to 10 CFR 50.59
    - » Potential for changes to state of knowledge from operating experience, experimental data, testing, etc., may be greater for first non-LWR advanced reactors than current LWRs
- Screening
  - Changes to the facility or procedures that render a safety-significant SSC unable to meet its reliability or capability targets would “screen in” for an evaluation

Issues for Discussion (cont.)

- Evaluation (general)
  - Current eight criteria in 10 CFR 50.59 are tailored for typical LWR deterministic safety case based on general design criteria
    - » Not ideally suited for a reactor with an LMP-based affirmative safety case
  - 10 CFR 50.59 criteria sorted in to three categories
    - » Accidents
    - » SSCs
    - » Methods of evaluation
  - General structure and wording of current 10 CFR 50.59 criteria retained to the extent practical
  - White paper proposes six “LMP 50.59 criteria” to be used instead of current eight 10 CFR 50.59 criteria

Issues for Discussion (cont.)

Accident criteria (10 CFR 50.59 criteria i, iii, and v)

a) Result in a change to the frequency or consequences of one or more AOOs, DBEs, or BDBEs documented in the final safety analysis report (as updated) in a manner that would exceed the NEI 18-04 Frequency-Consequence Target or change an LBE from non-risk significant to risk significant according to NEI 18-04 LBE risk significance criteria.

b) Result in more than a minimal increase in the consequence of a Design Basis Accident documented in the final safety analysis report (as updated).

c) Result in one or more an AOO, DBE, or BDBE that is (i) not previously evaluated in the UFSAR and (ii) classified as risk significant according to NEI 18-04 LBE risk significance criteria.

Issues for Discussion (cont.)

SSC Criteria (10 CFR 50.59 criteria ii, iv, vi, and vii)

d) Result in an increase in the frequency or consequences of a malfunction of any safety-significant SSC that would change the classification of the SSC from non-risk significant to risk-significant.

e) Result in an increase in the frequency or consequences of a malfunction of a safety-significant SSC that would have a more than minimal adverse effect on defense-in-depth adequacy or lead to a change in safety classification from NST to NSRST to maintain adequate defense-in-depth.

Issues for Discussion (cont.)

SSC Criteria (10 CFR 50.59 criteria ii, iv, vi, and vii) (cont.)

- LMP 50.59 Defense-in-Depth (DID) criterion (e) focuses on NEI 21-07 documentation of Integrated DID (plant capability and programmatic DID) in SAR Section 4.2.3
  - » Criterion is that “more than minimal adverse effect” on DID adequacy requires a license amendment
  - » Expectation is that licensee will establish guidelines for “more than minimal” during the development and documentation of the LMP affirmative safety case, in the SAR or plant records

Issues for Discussion (cont.)

- SSC Criteria (10 CFR 50.59 criteria ii, iv, vi, and vii) (cont.)
  - No LMP 50.59 criteria correspond directly to fission product barrier design limits (10 CFR 50.59 criterion vii)
  - LMP safety case - including the DID approach - is fundamentally different from LWR general design criteria-based approach to DID
    - » Three barrier fission product barrier DID model is specific to LWR technology and may not apply to other designs
    - » With LMP, impacts of changes on all safety- significant SSCs (not just fission product barriers) and DID are addressed by LMP 50.59 criteria (d) and (e).
    - » A traditional LWR fission product barrier may be classified as a safety-related or NSRST SSC but such SSCs are not elevated above other SSCs

Issues for Discussion (cont.)

- Method of Evaluation Criterion (10 CFR 50.59 criterion viii)

  f) Result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses, with the exception of LBE evaluation methods under the change control of the Non-LWR PRA Standard.

  – This wording is equivalent to current 10 CFR 50.59 criterion (viii) for design basis accidents except that

    » Those LBE evaluations (and associated methods) performed in the PRA (i.e., AOOs, DBEs, and BDBEs) are not subject to a 10 CFR 50.59 evaluation

    » They are instead covered by the Non-LWR PRA Standard

Tabletop Exercises – Objectives & Schedule

Objectives

- Guidance is being developed to evaluate changes to advanced reactor facilities that plan to be licensed using NEI 18-04 methodology (e.g., 50.59 guidance for AR)
- The objective is to exercise the change evaluation guidance with reactor developers to:
  - Demonstrate usability of the process
  - Validate thresholds
  - Incorporate lessons learned to improve the process

Preliminary Schedule

- Planning – 6/6 to 6/10/2022
- Execution – 6/13 to 6/17/2022
- Develop lessons learned – 6/20 to 6/24/2022
- Complete deliverables – 6/27 to 6/30/2022

Tabletop Exercises – Format

- Remote work with a combination of individual evaluation and team meetings
- TICAP team will work with reactor developer team lead to create technology-specific examples that will be evaluated using the change evaluation guidance
- Tabletop participants will be provided the examples, ad hoc procedures, and other source materials during a kickoff meeting
- Technical leads will evaluate examples and then convene with the larger group to ask questions, discuss the proposed answers to the criteria and the bases for those answers, etc.
- Meeting minutes will capture key discussions and challenges to develop the lessons learned & actions

Example Changes to the Facility	LMP 50.59 Criteria
1	Criterion (a)
1, 4	Criterion (b)
1	Criterion (c)
2	Criterion (d)
2	Criterion (e)
2	Criterion (f)
3	Criterion (g)
5, 6, 7	Whole process AD/Screen/Eval

Tabletop Exercises – Deliverables

- Evaluation, with a documented basis, for each of the criteria selected for each example (some examples will test applicability and screening)
- Meeting minutes that include key discussions and considerations
- Summary of lessons learned
- Recommendations for improving the guidance

Questions

BACKUP SLIDES

10 CFR 50.59 Evaluation Criteria for an LMP-based Affirmative Safety Case

10 CFR 50.59(c)(2) Criteria	LMP 50.59 Criteria for an LMP-based Affirmative Safety Case	Comments
Category 1 - Accidents		
(i) Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final safety analysis report (as updated); (iii) Result in more than a minimal increase in the consequences of an accident previously evaluated in the final safety analysis report (as updated); [See NEI 96-97 Sections 4.3.1 and 4.3.3, respectively]	(a) Result in a change to the frequency or consequences of one or more AOOs, DBEs, or BDBEs documented in the final safety analysis report (as updated) in a manner that would exceed the NEI 18-04 Frequency-Consequence Target or change an LBE from non-risk significant to risk significant according to NEI 18-04 LBE risk significance criteria. (b) Result in more than a minimal increase in the consequence of a Design Basis Accident documented in the final safety analysis report (as updated).	Risk significance of an LBE in LMP context and in the non-LWR PRA standard requires the consideration of the combination of frequency and consequence effects. There are no criteria to evaluate these components of risk separately. LMP DBAs are evaluated deterministically like LWR accidents. Therefore, determining if a change leads to a "more than minimal increase" in DBA consequences should follow the existing NEI 96-07 Section 4.3.3 guidance.
v) Create a possibility for an accident of a different type than any previously evaluated in the final safety analysis report (as updated); [See NEI 96-07 Section 4.3.5]	(c) Result in one or more an AOO, DBE, or BDBE that is (i) not previously evaluated in the UFSAR and (ii) classified as risk significant according to NEI 18-04 LBE risk significance criteria.	Newly identified LBEs or changes to LBE frequencies and consequences that are not risk significant should be documented in the next final safety analysis report update but the associated change does not require prior NRC review.

10 CFR 50.59 Evaluation Criteria for an LMP-based Affirmative Safety Case

10 CFR 50.59(c)(2) Criteria	LMP 50.59 Criteria for an LMP-based Affirmative Safety Case	Comments
Category 2 - SSCs		
(ii) Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the final safety analysis report (as updated); (iv) Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final safety analysis report (as updated); [See NEI 96-07 Sections 4.3.2 and 4.3.4, respectively] (vi) Create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final safety analysis report (as updated); [See NEI 96-07 Section 4.3.6]	(d) Result in an increase in the frequency or consequences of a malfunction of any safety-significant SSC that would change the classification of the SSC from non-risk significant to risk-significant. (e) Result in an increase in the frequency or consequences of a malfunction of a safety-significant SSC that would have a more than minimal adverse effect on defense-in-depth adequacy or lead to a change in safety classification from NST to NSRST to maintain adequate defense-in-depth.	10 CFR 50.59(c)(2) criteria (ii), (iv), (vi), and (vii) are addressed collectively by LMP 50.59 criteria (d) and (e). Changes with the impacts on the LMP-based affirmative safety case described in (d) or (e) are deemed to require prior NRC approval.

10 CFR 50.59 Evaluation Criteria for an LMP-based Affirmative Safety Case

10 CFR 50.59(c)(2) Criteria	LMP 50.59 Criteria for an LMP-based Affirmative Safety Case	Comments
Category 2 - SSCs		
(vii) Result in a design basis limit for a fission product barrier as described in the FSAR (as updated) being exceeded or altered; [See NEI 96-07 Section 4.3.7]	No specific criterion	The DID provided by LWR fission product barriers is addressed in a holistic manner in NEI 18-04. There is no need to single out fission product barriers in LMP 50.59 criteria; instead, impacts of changes on all safety- significant SSCs (not just fission product barriers) and DID are addressed by LMP 50.59 criteria (d) and (e).

10 CFR 50.59 Evaluation Criteria for an LMP-based Affirmative Safety Case

10 CFR 50.59(c)(2) Criteria	LMP 50.59 Criteria for an LMP-based Affirmative Safety Case	Comments
Category 3 – Methods of Evaluation		
(viii) Result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses. [See NEI 96-07 Section 4.3.8]	(f) Result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses, which the exception of LBE evaluation methods under the change control of the Non-LWR PRA Standard.	Evaluation of changes to methods of evaluation should follow NEI 96-07 Section 4.3.8 guidance. Note that methods of evaluation used in the PRA are not addressed by 10 CFR 50.59 (see Section 3.1.6 of this guidance). Such methods are instead managed by New Methods and Configuration Control requirements in the non-LWR PRA Standard ASME/ANS RA-S-1.4-2021. These include methods of evaluation for AOOs, DBEs, and BDBEs.

Update on Pre-Application Engagement on Advanced Reactor Licensing
(Courtney Banks, Adrian Muniz, Mallecia Sutton)

Pre-Application Engagement on Advanced Reactor Licensing

Adrian Muñiz, Mallecia Sutton, and Courtney Banks

Advanced Reactor Licensing Branch 1

NRC staff view on pre-application engagement and current status

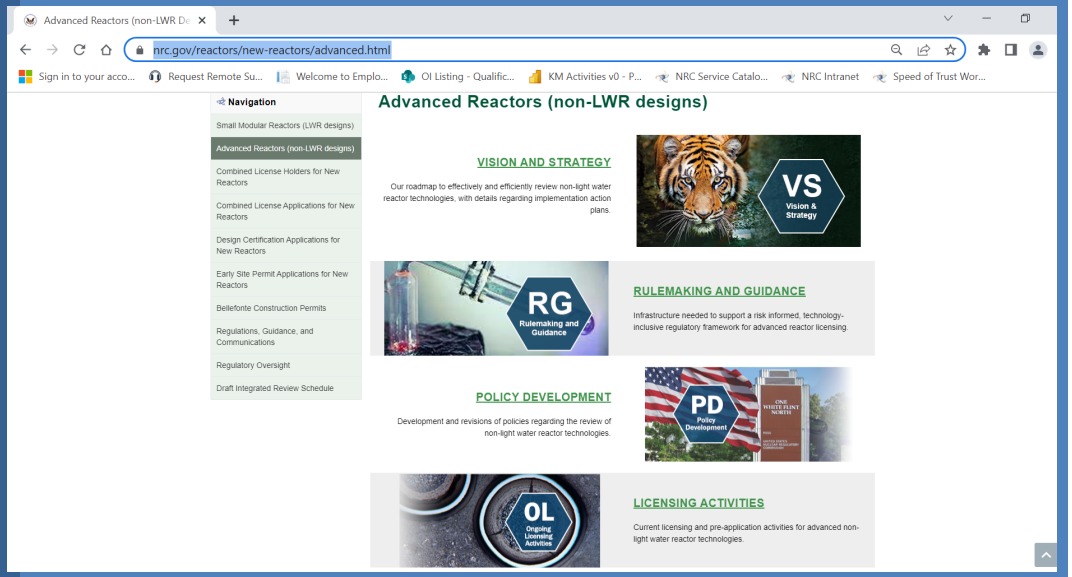
The NRC staff encourages pre-application interactions with advanced reactor potential applicants and vendors to provide stability and predictability in the licensing process through early identification and resolution of technical and policy issues that would affect licensing.

Seven advanced reactor potential applicants and vendors have submitted new or revised regulatory engagement plans in the past year that include many of the activities addressed in the NRC staff draft white paper, “Pre-application Engagement to Optimize Advanced Reactors Application Reviews” (ADAMS Accession No. ML21145A106), issued in May 2021.

By-the-Numbers Snapshot of Pre-Application Engagement Activities

- 10 regulatory engagement plans submitted
- Topical Reports
  - 10 completed
  - 8 under review
  - 37 projected to be submitted in the next 2 years
- White Papers
  - 18 completed
  - 10 under review
  - 38 projected to be submitted in the next 2 years

Advanced Reactor Webpage



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

Advanced Reactor Webpage

- Discuss updates to website
  - https://www.nrc.gov/reactors/new-reactors/advanced.html
- Provide a demo of the advanced reactor page
- New Listserve subscriptions

Questions?